CHE RUOLO HANNO GLI SCORE GERIATRICI ?

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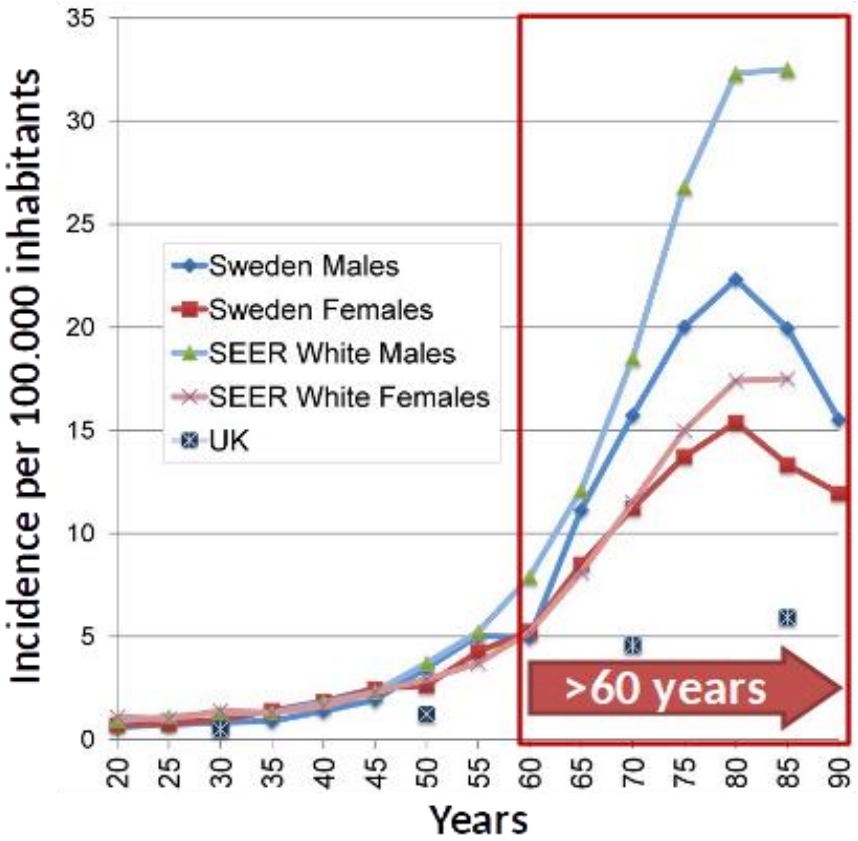
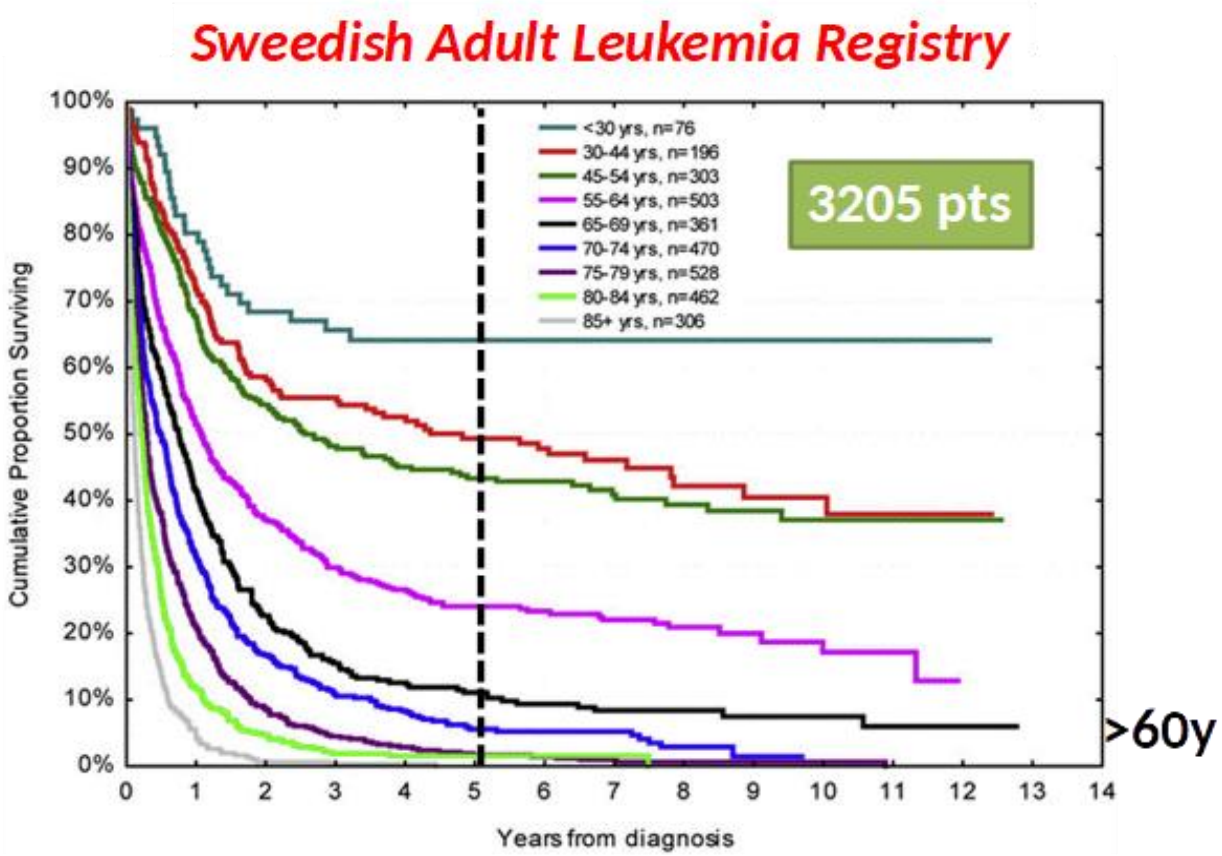
Disclosures of Name Surname

Company name	Research support	Employee	Consultant	Stockholder	Speakers bureau	Advisory board	Other
MEDAC					X		
Astellas					X		
MSD					X		

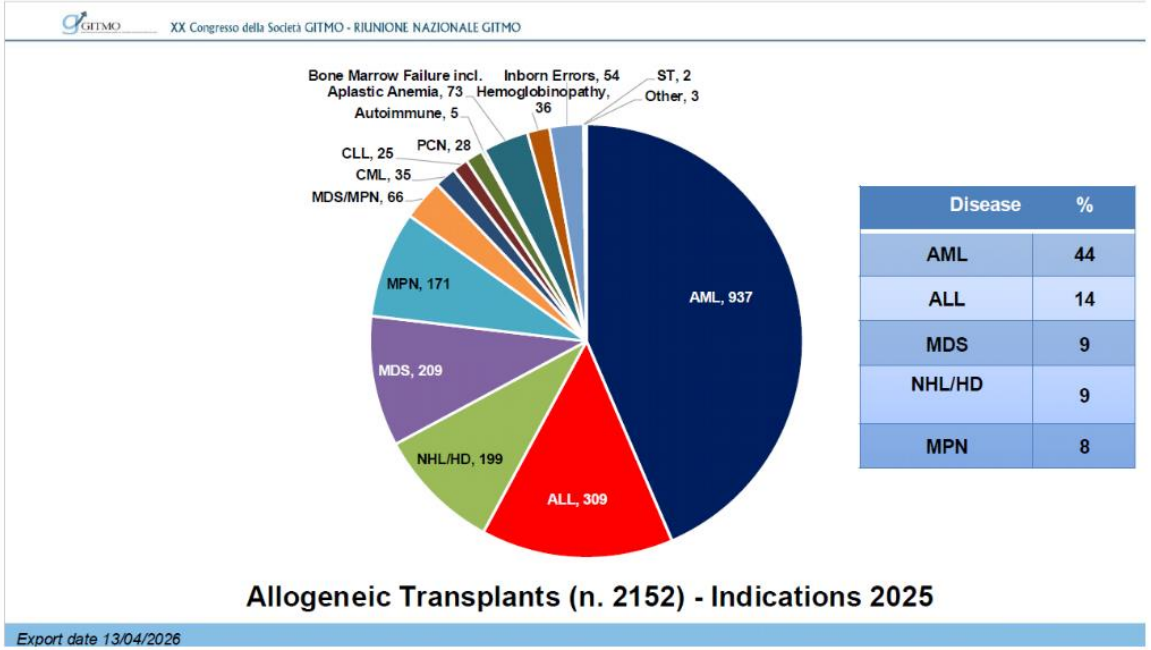
BACKGROUND (1)



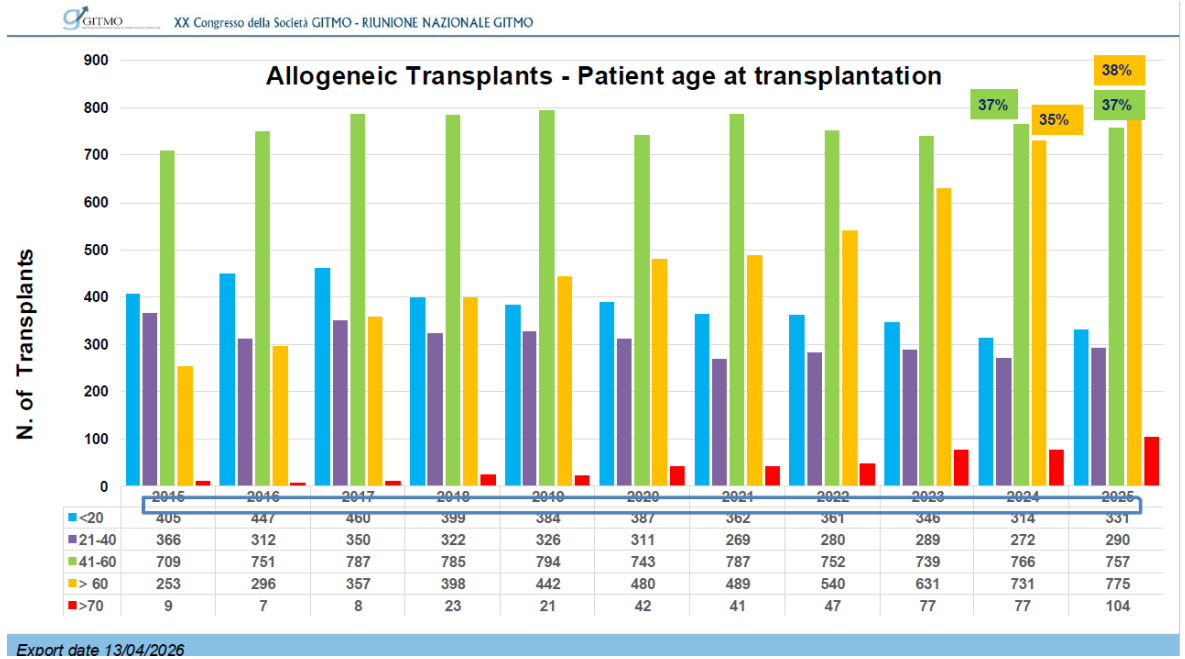


Juliusson G. *Blood 2012*; 119: 3890-9; SEER. *Cancer Statistics Review* 1975-2008; Bhayat F et al. *BMC Cancer. 2009*;9:252..

BACKGROUND (2)



Disease	%
AML	44
ALL	14
MDS	9
NHL/HD	9
MPN	8



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
<20	405	447	460	399	384	387	362	361	346	314	331
21-40	366	312	350	322	326	311	269	280	289	272	290
41-60	709	751	787	785	794	743	787	752	739	766	757
> 60	253	296	357	398	442	480	489	540	631	731	775
>70	9	7	8	23	21	42	41	47	77	77	104

Transplantation and Cellular Therapy 28 (2022) 96.e1–96.e11

ELSEVIER

Transplantation and Cellular Therapy

journal homepage: www.tctjournal.org

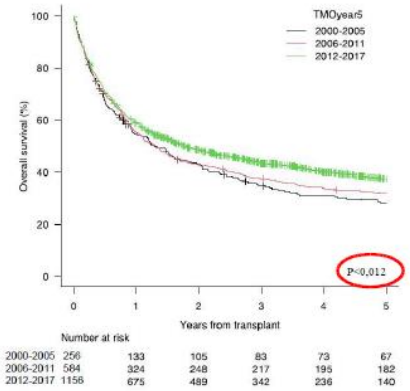
ASTCT American Society for Transplantation and Cellular Therapy

Full Length Article
Allogeneic – Adult

GITMO Registry Study on Allogeneic Transplantation in Patients Aged ≥60 Years from 2000 to 2017: Improvements and Criticisms

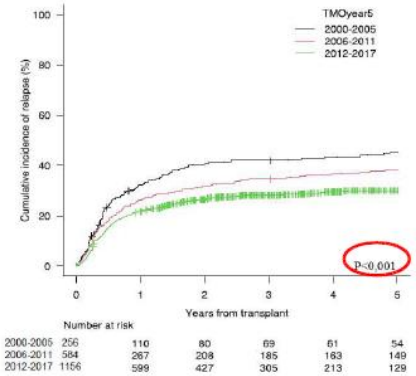
Michele Malagola[1,*], Nicola Polverelli[1], Vicky Rubini[1], Massimo Martino[2], Francesca Patriarca[3], Benedetto Bruno[4], Luisa Giaccone[4], Giovanni Grillo[5], Stefania Bramanti[6], Paolo Bernasconi[7], Marco De Gobbi[8], Annalisa Natale[9], Elisabetta Terruzzi[10], Attilio Olivieri[11], Patrizia Chiusolo[12], Angelo Michele Carella[13], Marco Casini[14], Chiara Nozzoli[15], Patrizio Mazza[16], Simona Bassi[17], Francesco Onida[18], Adriana Vacca[19], Sadia Falcioni[20], Mario Luppi[21], Anna Paola Iori[22], Vincenzo Pavone[23], Cristina Skert[24], Paola Carluccio[25], Carlo Borghero[26], Anna Proia[27], Carmine Selleri[28], Nicoletta Sacchi[29], Sonia Mammoliti[30], Elena Oldani[31], Fabio Ciceri[32], Domenico Russo[1], Francesca Bonifazi[33]

OS



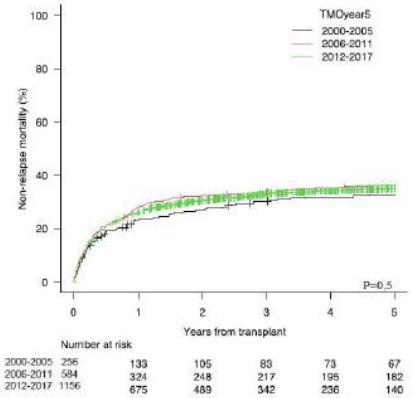
OS at 1y 54.5% vs 55.6% vs 58.9%
OS at 2y 43.1% vs 42.7% vs 48.6%
OS at 5y 28.4% vs 31.8% vs 37.3%

CIR



RI at 1y 32.3% vs 26.2% vs 21.7%
RI at 2y 40.8% vs 32.0% vs 26.6%
RI at 5y 45.3% vs 38.2% vs 30.0%

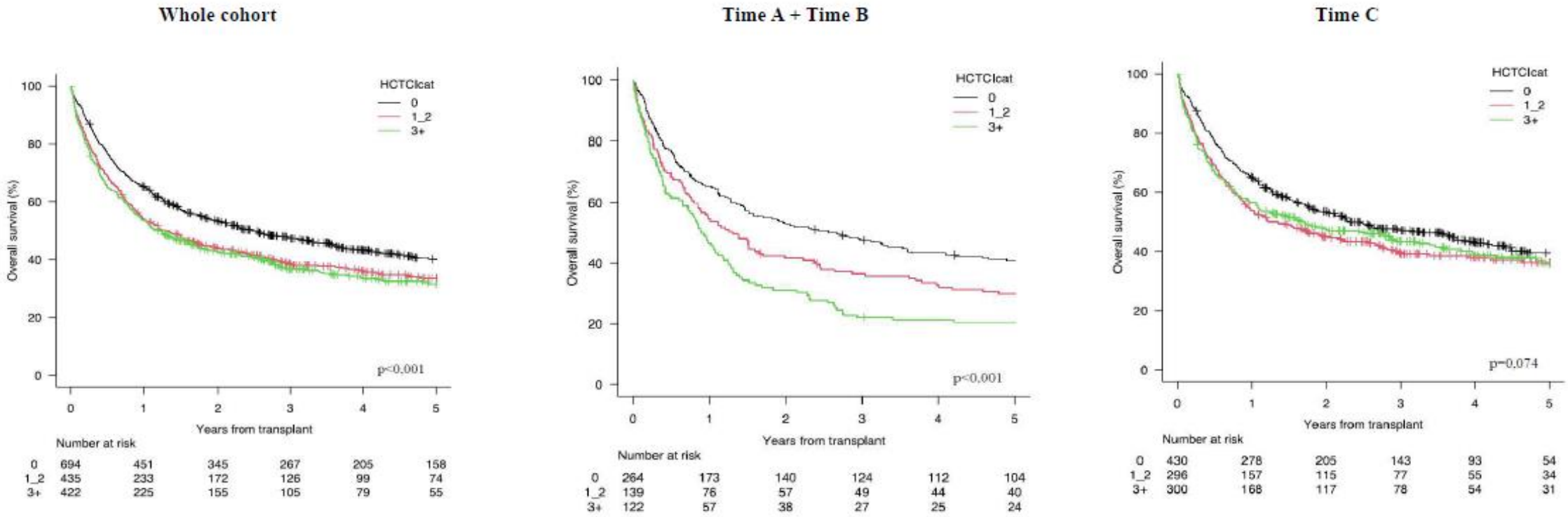
NRM



NRM at 1y 23.2% vs 28.0% vs 26.1%
NRM at 2y 26.9% vs 32.4% vs 30.5%
NRM at 5y 32.8% vs 36.2% vs 35.0%

HCT-CI: is it useful in clinical practice above the age of 60 yrs?

Figure 4B.



Malagola M et al, TCT 2022

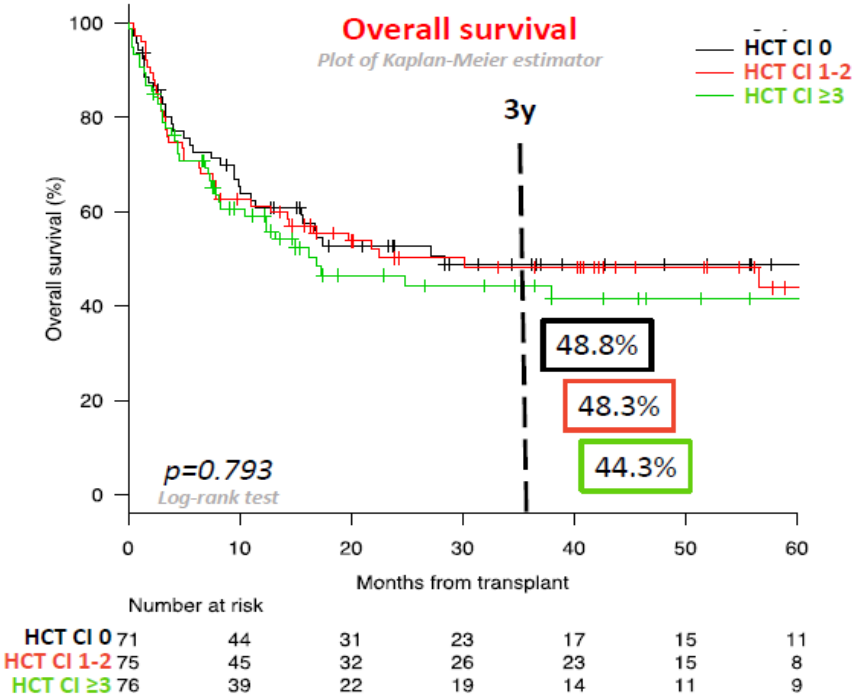
Bone Marrow Transplantation
https://doi.org/10.1038/s41409-020-0934-1

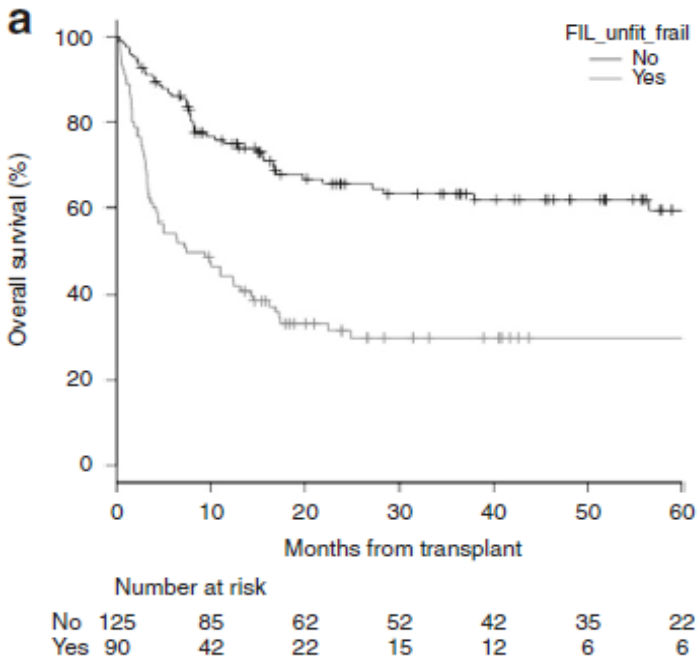
ARTICLE

Multidimensional geriatric assessment for elderly hematological patients (≥60 years) submitted to allogeneic stem cell transplantation. A French–Italian 10-year experience on 228 patients

2020

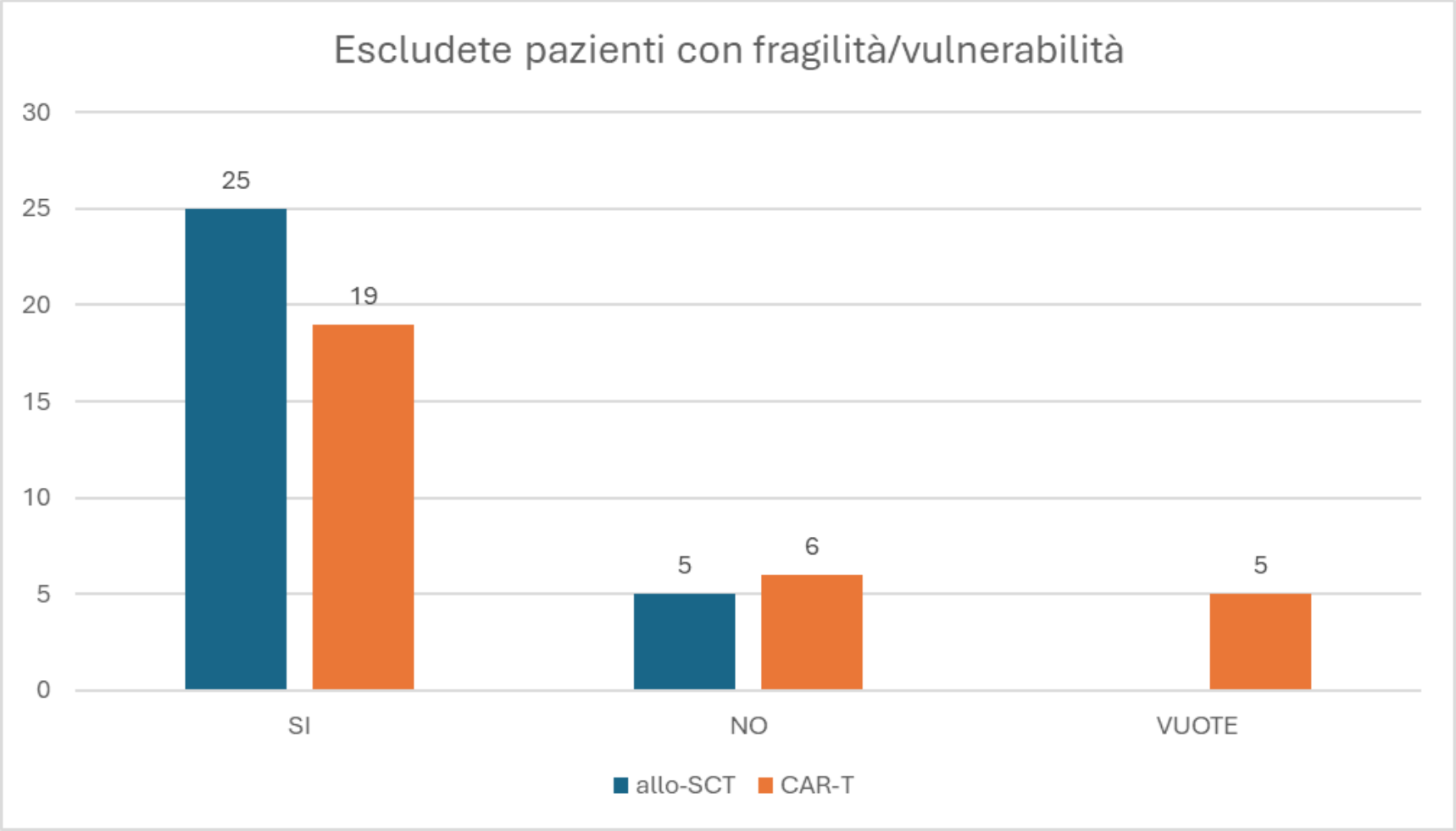
Nicola Polverelli[1] · Paolo Tura[1,2] · Giorgia Battipaglia[2] · Michele Malagola[1] · Simona Bernardi[1,3] · Lisa Gandolfi[1] · Tatiana Zollner[1] · Camilla Zanaglio[1,3] · Mirko Farina[1] · Enrico Morello[1] · Alessandro Turra[1] · Mohamad Mohty[2] · Domenico Russo[1]





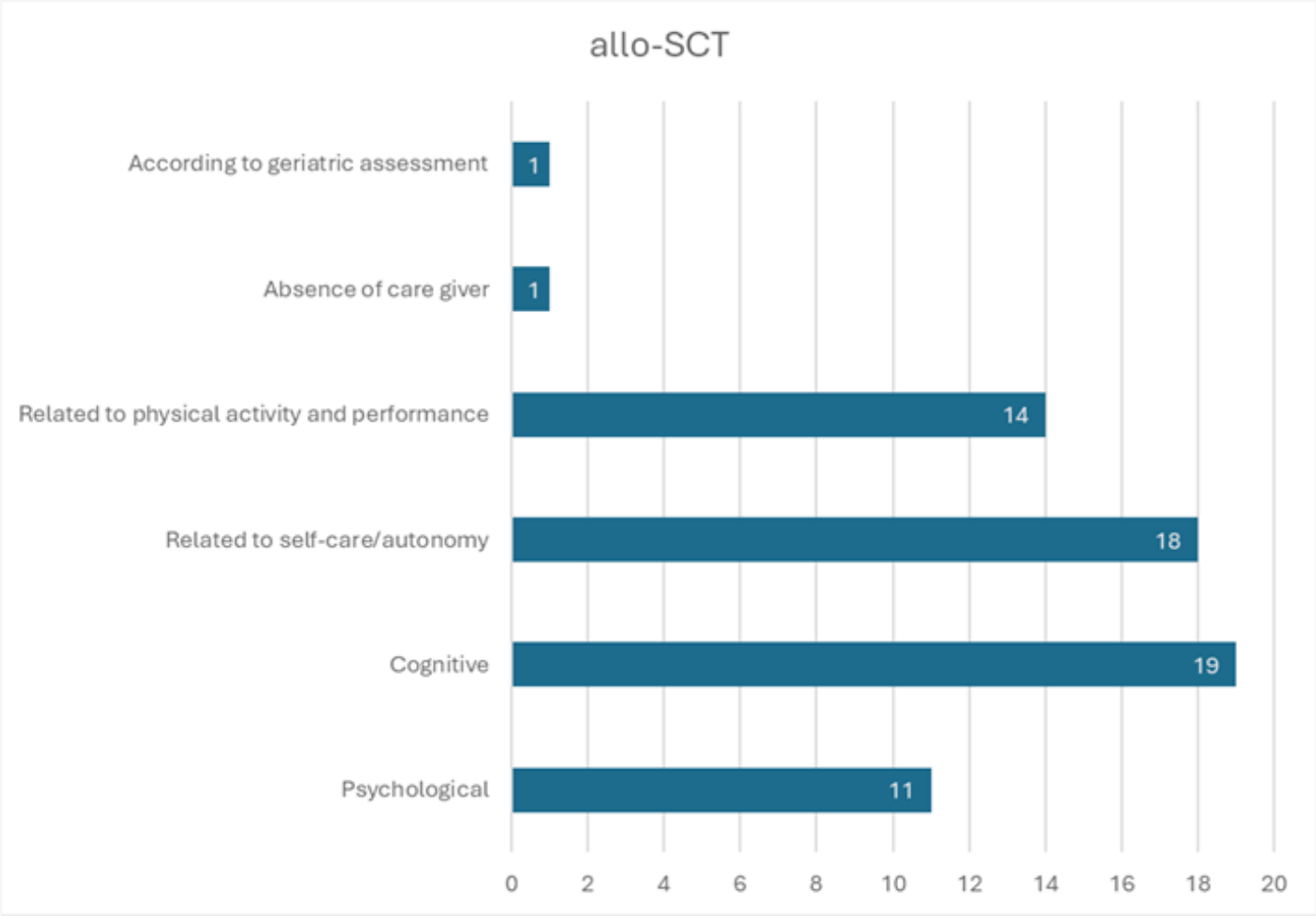
Do you exclude a patient to allo-SCT or CART based on frailty?

Malagola M et al, Leuk & Lymph 2025



Do you exclude a patient to allo-SCT based on frailty?

Malagola M et al, Leuk & Lymph 2025



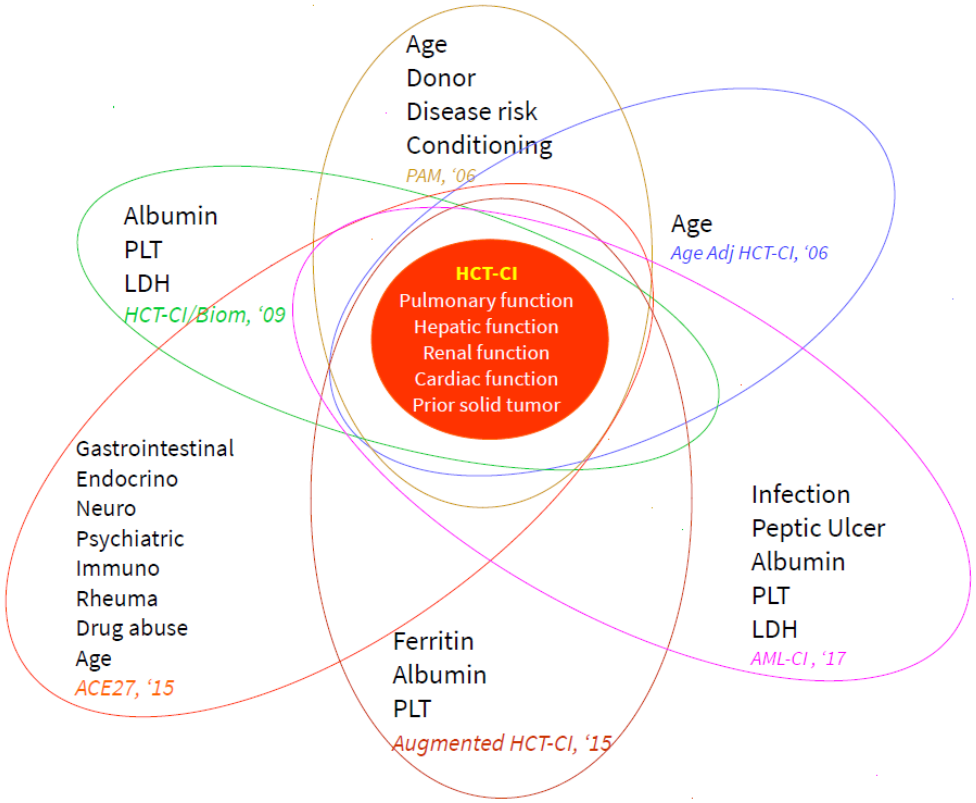
FRAILTY

- Frailty incidence in transplant setting: 10-25%
- Frailty is associated with poor outcome (morbidity and mortality)
- Dynamic process
- Can be reversible through pre-habilitation programs

Jayani R 2019; Klepin HD 2018; Williams GR 2014; Hamaker ME 2017; Muffly LS 2014; Deschler B 2018; Derman BA 2019; Holmes HM 2014; Lin RJ 2019; Nawas MT 2019; Salas MQ 2021

Multidimensional Geriatric Assessment

COMORBIDITY



FRAILTY and COMPREHENSIVE GERIATRIC ASSESSMENT

Ware JE 1992	- SF-36 PCS / SF-26 MCS	→	36 item (QoL) for physical assessment 26 item (QoL) for mental assessment
Podsiadlo 1991	– TUG (Time Up and Go)	→	time for 3 m walking (two ways)
McDowell 1997	– ADL (Activities of Daily Life)	→	from 0 to 6 for daily living
Graf 2008	– IADL (Instrumental Activities of Daily Life)	→	from 0 to 8 for daily activities
Beelman 1997	– CES-D (Center for Epidemiologic Studies on Depression)	→	items for depression assessment
Saliba 2001	– VES13 (Vulnerable Elders Survey)	→	13 items for geriatric assessment
Bland 2001	– 3-MS (Mini-Mental State Examination)	→	test for dementia
Fried 2001	- FFI (Fired Frailty Index)	→	5 parameters (self reported and PS)
Rantanen 2003	– SPPB (Short Physical Performance Battery)	→	test for physycal performance
Rockwood 2005	– CFS (Clinical Frailty Scale)	→	9 point-scale (from very fit to terminal)
Rejesky 2008	- PAT-D (Pepper Assessment Tool for Disability)	→	23 items on mobility+ADL+IADL
Hurria 2009	- DT (Distress Thermometer)	→	1 item for level of distress (0 to 10)
Bellera 2012	– G8 (Geriatric 8)	→	8 items (food, weight, mobility, BMI,…)
Bonanad 2015	- GAH scale (Geriatric Assessment in Hematology)	→	30 items (medications, ADL, nutrition,..)
Palumbo 2015	– IMWG Frailty Score (Int Myeloma WG)	→	30 item including CCI

Table 5. Augmentation of HCT-CI predictability by combining with other models[85]

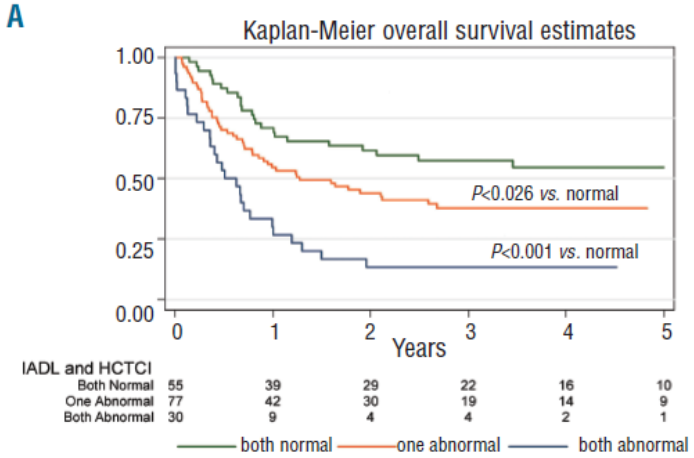
Composite model	*Risk groups*		*Outcomes at 2 years*		*Outcomes at 4 or 5 years*	
	HCT-CI	*KPS*	*NRM (%)*	*OS (%)*	*NRM (%)*	*OS (%)*
Comorbidity/PS[14]	0–2	> 80%	16	68		
Sorror M Cancer 2008	0–2	⩽ 80%	17	58		
	⩾ 3	> 80%	30	41		
	⩾ 3	⩽ 80%	39	32		
Comorbidity/age score[46] (nonmyeloablative versus RIC)	HCT-CI/age					
Sorror M JCO 2014	0		5–12	81–87		
	1–2		9–18	66–67		
	3–4		17–36	47–54		
	⩾ 5		35–41	34–35		
Comorbidity/relapse score (patients ⩾ 60 years old)[41]	HCT-CI	Relapse risk score				
Sorror M JAMA 2011	0	Low				69
	0	Standard				45
	0	High				41
	1–2	Low				56
Elsawy M BBMT 2014	1–2	Standard				44
	1–2	High				15
	⩾ 3	Low				56
	⩾ 3	Standard				23
	⩾ 3	High				23
HCT-CI/EBMT[42]	HCT-CI	EBMT				
Muffly LS Haematol 2014	0	< 4			11	72
	0	⩾ 4			19	61
	1–2	< 4			16	63
	1–2	⩾ 4			28	48
	⩾ 3	< 4			31	40
	⩾ 3	⩾ 4			41	30
HCT-CI/IADL[43]	*Scores*					
HCT-CI score of ⩾ 3 or IADL score < 14 acquire a score of 1. Both abnormalities get a score of 2	0			62		
	1			44		
	2			13		

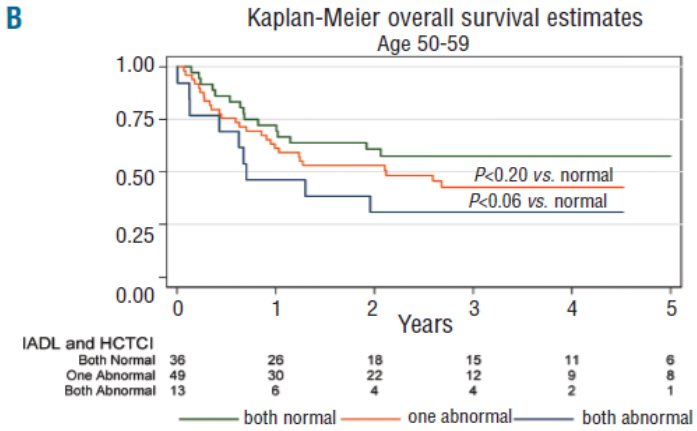
Elsawy M et al, BMT 2016

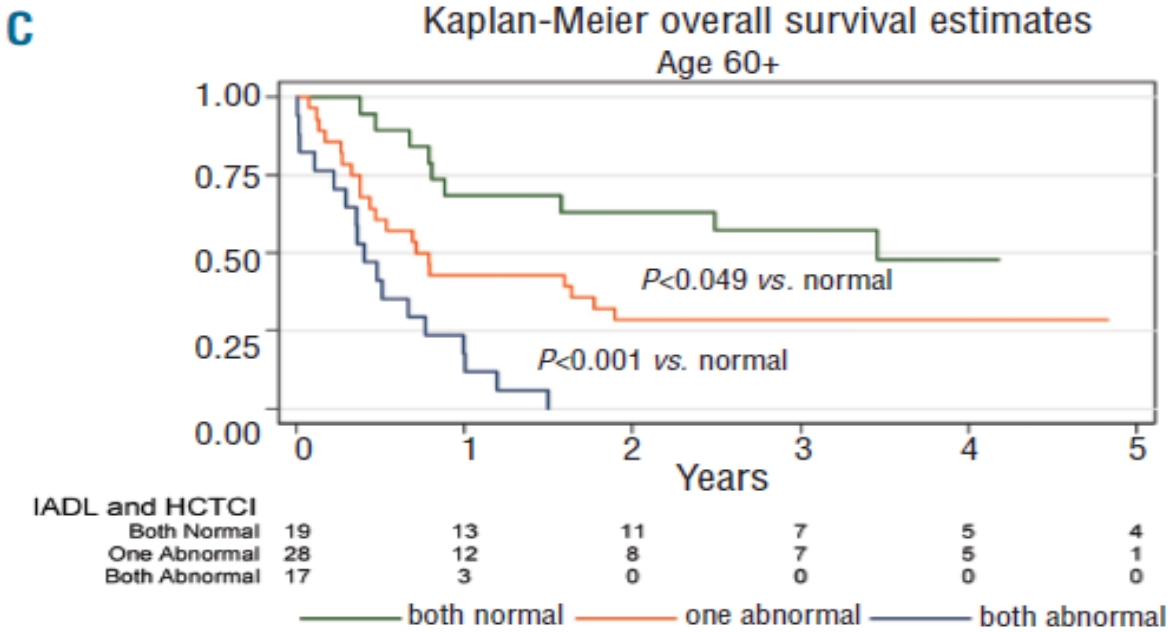
Geriatric assessment to predict survival in older allogeneic hematopoietic cell transplantation recipients

Haematol 2014

Lori S. Muffly,[1] Masha Kocherginsky,[2] Wendy Stock,[1] Quynh Chu,[1] Michael R. Bishop,[1] Lucy A. Godley,[1] Justin Kline,[1] Hongtao Liu,[1] Olatoyosi M. Odenike,[1] Richard A. Larson,[1] Koen van Besien,[3] and Andrew S. Artz[1]







Frailty assessment in adults undergoing allogeneic hematopoietic cell transplantation: insights from a multicenter GETH-TC study to optimize outcomes and care

Salas QM et al, Front Immun 2025

- 404 allo-SCT
- Age > 18 (median 56)
- 23% > 65 y

Study Design: Multicenter Implementation of the HCT Frailty Scale

To whom?
All adults candidates for HCT
Who performs the evaluation?
Medical Doctor Nurse Team Laboratory (regular bloodwork)
Median time needed
10 minutes
When frailty is evaluated?
First Consultation HCT Admission Day +100, 6 months, 1 year
Initial Equipment
Hand Dynamometer (Grip Strenght Test assessment)
Costs
No additional costs

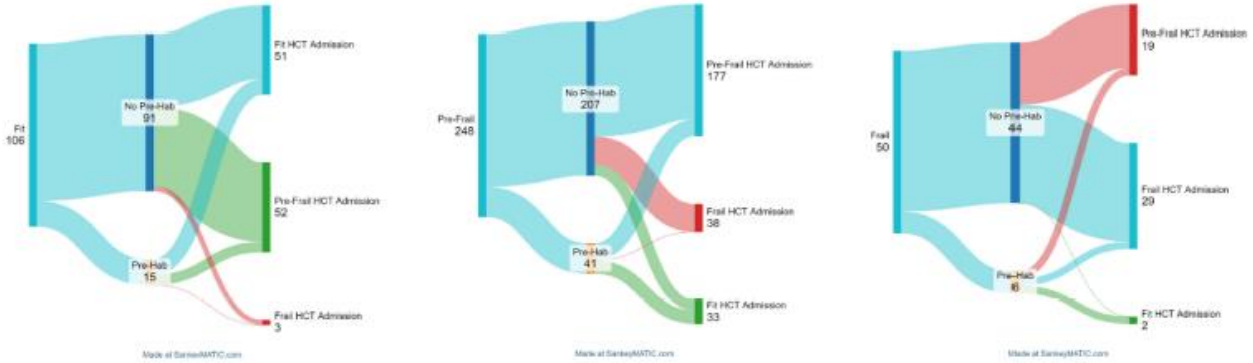
HCT Frailty Scale
Clinical Frailty Scale (CFS) ≥ 3 (Frail) (vs. 1-3; Not-Frail)
Instrumental Activities of Daily Living (IADL) Scale ≥ 1 Limitation (vs. No Limitations)
Timed Up and Go Test (TUGT) Abnormal > 10 seconds (vs. Normal)
Grip Strenght (GS) Test Abnormal (vs. Normal) If female < 16Kg If male < 26 Kg
Self-Rated Health Question (SRH-Q) Fair, Poor (vs. Excellent, Very Good, Good)
Fall in last 6 months Yes (vs. No)
Albumin Serum Level Abnormal (<38 g/L) (vs. Normal)
C-Reactive Protein (CRP) Abnormal (≥11 mg/L) (vs. Normal)
Mini Cog Test Abnormal if 0-2 (vs. Normal if 3-5)

HCT Frailty Scale

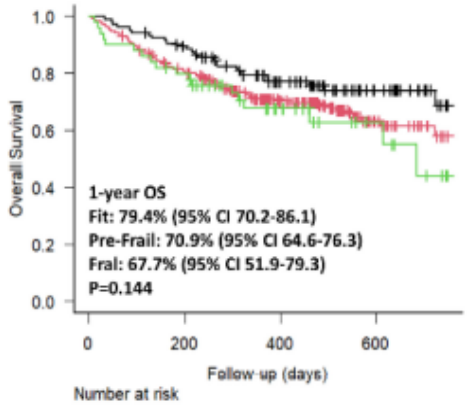
HCT Frailty Scoring System	Normal	Abnormal
Clinical Frailty Score: ≥3 (frail) (vs 1-2)	0	1.5
IADL Score: ≥1 Limitation (vs No Limitation)	0	1
TUGT: Abnormal (vs Normal)	0	1.5
Grip Strength: Abnormal (vs Normal)	0	1
Self-Rated Health Question D E, F (vs A, B, C)	0	1
Fall in last 6 months: Yes (vs No)	0	1
Albumin Level: Abnormal (vs normal)	0	1.5
C-Reactive Protein: Abnormal (vs normal)	0	2
Total Score:	0	10.5
Patients´s Classification:	Fit Pre-Frail Frail	≤1 >1 < 5.5 ≥5.5

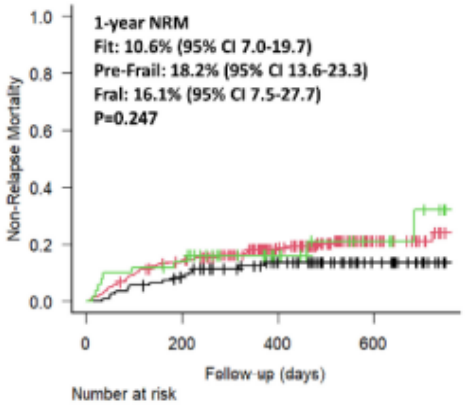
Dynamics of Frailty According to Pre-Habilitation

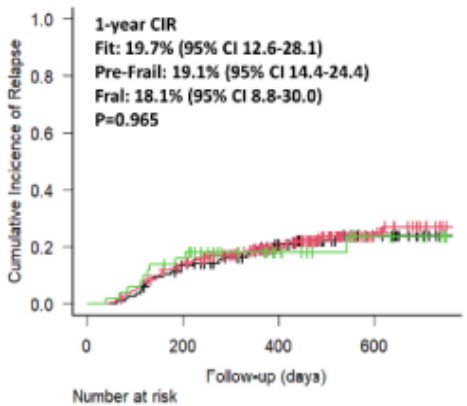
Distribution of Patients Based on Pre-Habilitation	First Consultation	HCT Admission
PRE-HABILITATION N=61	N=62	N=62
Fit	15 (24.2)	29 (46.8)
Pre-Frail	41 (66.1)	31 (50.0)
Frail	6 (9.7)	2 (3.2)
NO PRE-HABILTIATION n=316	N=342	N=342
Fit	91 (26.6)	57 (16.7)
Pre-Frail	207 (60.5)	217 (63.5)
Frail	44 (12.9)	68 (19.9)
P VALUE	0.665	0.001



HCT Frailty Scale at the First Consultatiton







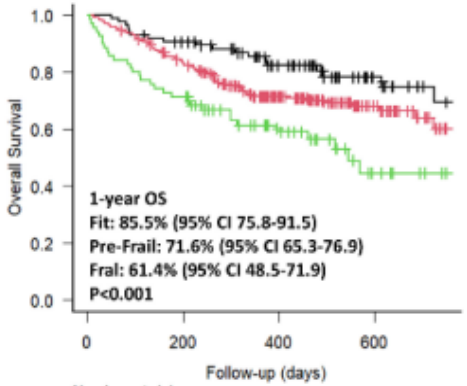
Number at risk

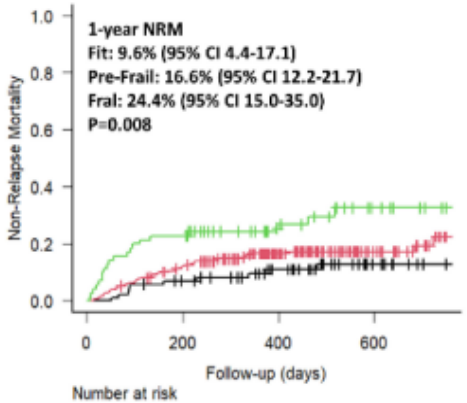
Fit	106	92	61	27
Pre-Frail	248	193	116	39
Frail	50	39	19	8

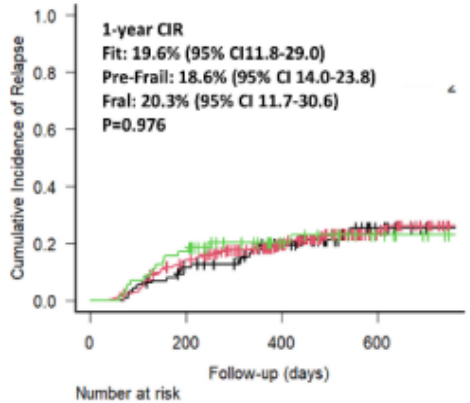
Fit	106	80	53	24
Pre-Frail	248	172	103	38
Frail	50	34	17	7

Fit	106	80	53	24
Pre-Frail	248	172	103	38
Frail	50	34	17	7

HCT Frailty Scale at HCT Admission







Number at risk

Fit	86	75	51	23
Pre-Frail	248	199	119	43
Frail	70	50	26	8

Fit	86	67	45	20
Pre-Frail	248	177	107	41
Frail	70	42	21	8

Fit	86	67	45	20
Pre-Frail	248	177	107	41
Frail	70	42	21	8

Salas QM et al, Front Immun 2025

HCT Pre-App program: a telemedicine-based prehabilitation for allogeneic hematopoietic cell transplant candidates

Blood Adv 2025

Raquel Sarahí Salinas Gonzalez,[1,2] Laia Guardia,[3] Berta Solé,[3] Cristina Moreno,[3] Noemi de Llobet,[3] Enric Cascos,[4] Julia Martinez-Sanchez,[2,5,6] Maribel Díaz-Ricart,[2,5,6] Enric Carreras,[7] Maite Antonio,[8] María Suárez-Lledó,[2,3,6] Laura Rosiñol,[2,3,6] Concepción Closa,[1] Raquel Sebio,[1] Carmen Martínez,[2,3,6] Francesc Fernández-Avilés,[2,3,6] Montserrat Rovira,[2,3,6] and María Queralt Salas[2,3,6]

NO PREHAB

n = 76

Frailty assessment only

PILOT PREHAB

n = 59

Individualized home exercise without digital supervision

TELE-PREHAB

n = 50

HCT Pre-App with remote rehabilitation supervision

HCT-FS

8 clinical, functional and laboratory variables → **FIT • PREFRAIL • FRAIL**

Assessment at consultation and HCT admission

HCT Pre-App program: a telemedicine-based prehabilitation for allogeneic hematopoietic cell transplant candidates

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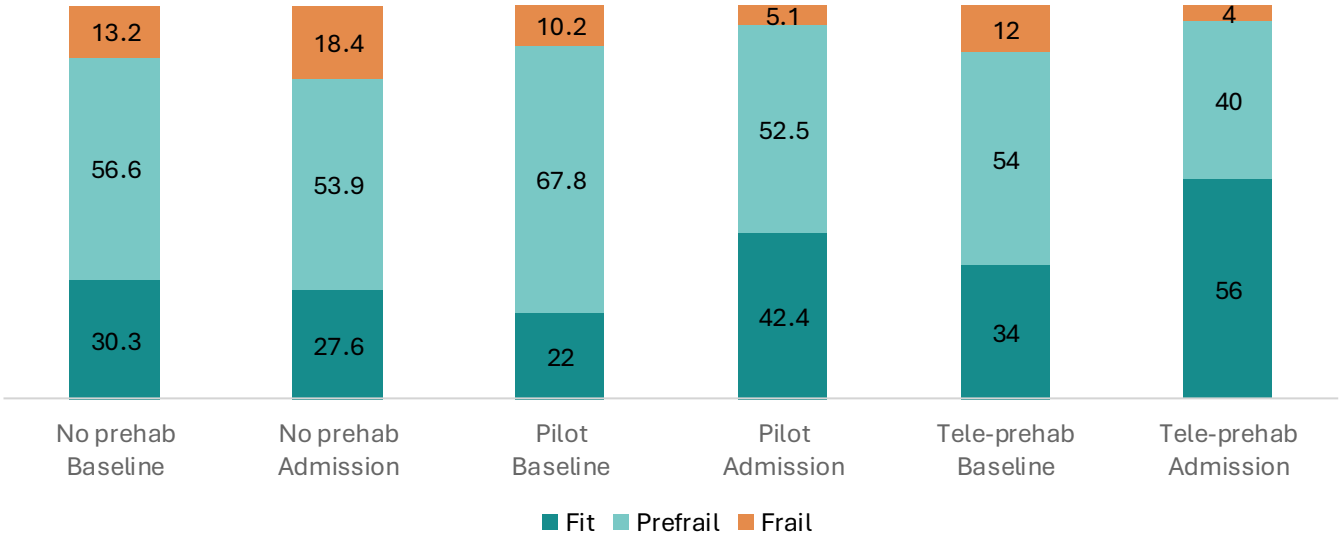
HCT Pre-App prescription

Initial in-person functional assessment: 5-STS, 1-MSTS and DASI

3 structured sessions/week, at least 30 min each
Resistance and balance training, plus daily aerobic activity

Weekly digital follow-up and exercise adjustment until admission



Feasible and safe, with survival impact still uncertain

90.7%

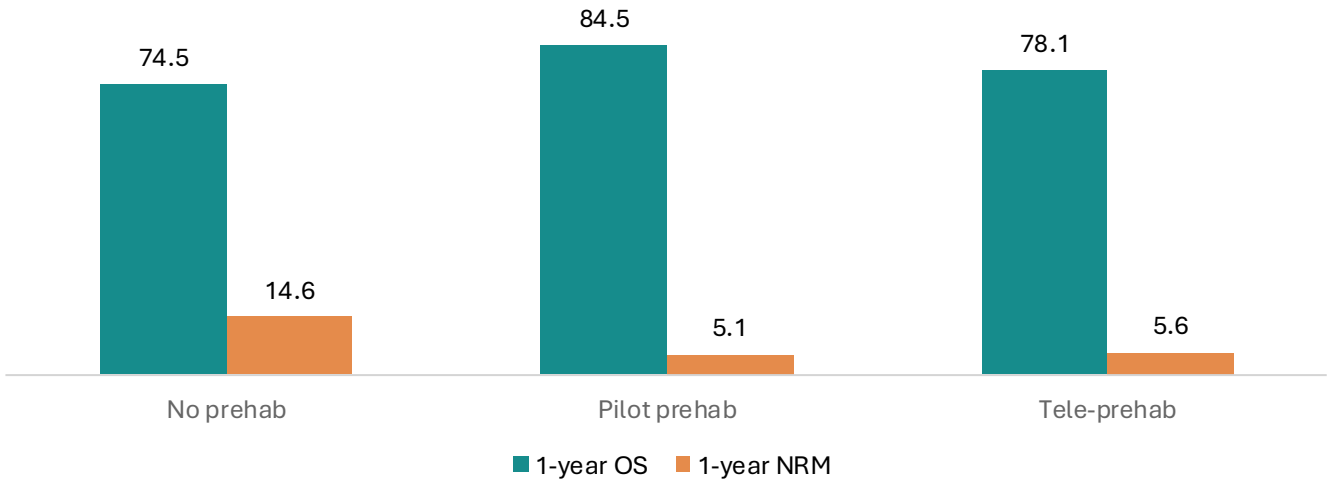
recruited
59 of 65 eligible recipients

82.1%

overall exercise adherence

0

exercise-related adverse events



Saltman, González et al. Blood Adv. 2026;10:2232–2243. doi:10.1182/bloodadvances.2025018378

CHARM is prognostic of geriatric morbidity and toxicity after allogeneic transplant for older adults: BMT CTN 1704 study

Blood Adv 2025

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CHARM inputs
Prospective assessment

Age
Comorbidity burden
Albumin and C-reactive protein
Weight loss
Patient-rated performance
Cognitive impairment

1,105

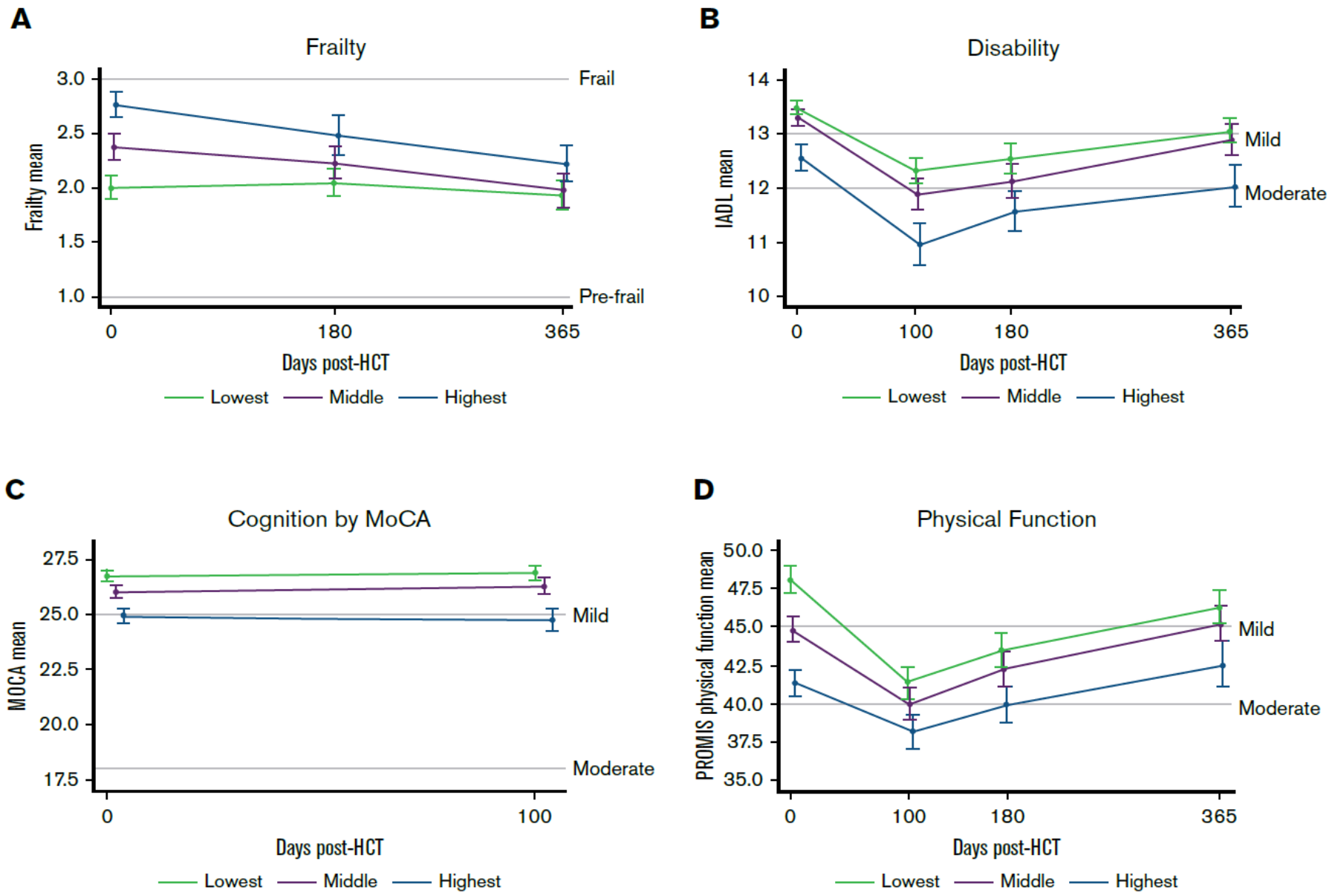
Patients aged ≥60 years

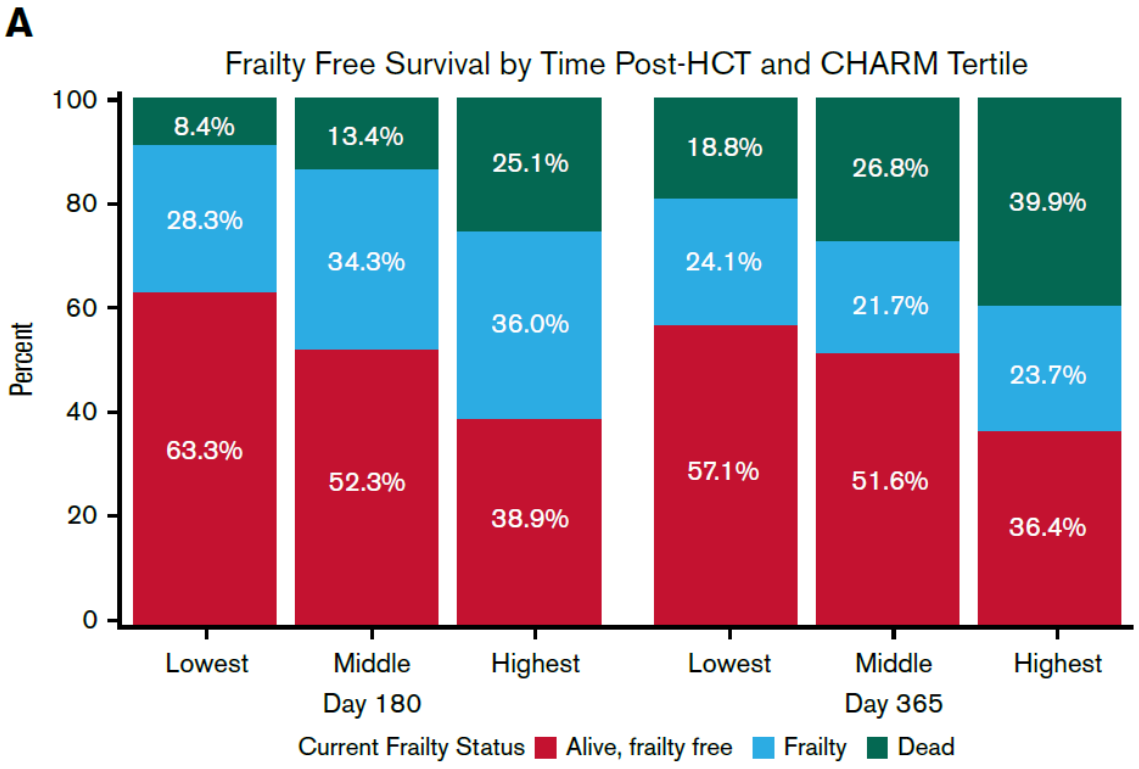
49

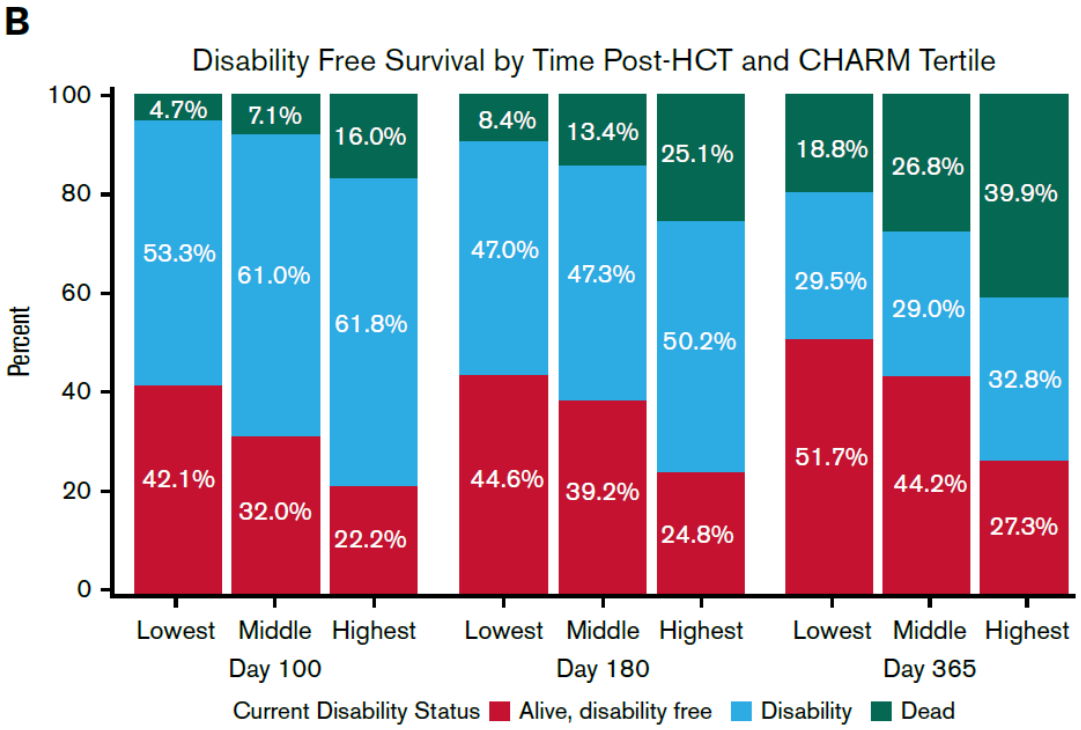
US transplant centers

1 year

Prospective follow-up


A
Frailty
Frailty mean
3.0
2.5
2.0
1.5
1.0
Frail
Pre-frail
0
180
365
Days post-HCT
Lowest
Middle
Highest
B
Disability
IADL mean
14
13
12
11
10
Mild
Moderate
0
100
180
365
Days post-HCT
Lowest
Middle
Highest
C
Cognition by MoCA
MOCA mean
27.5
25.0
22.5
20.0
17.5
Mild
Moderate
0
100
Days post-HCT
Lowest
Middle
Highest
D
Physical Function
PROMIS physical function mean
50.0
47.5
45.0
42.5
40.0
37.5
35.0
Mild
Moderate
0
100
180
365
Days post-HCT
Lowest
Middle
Highest





Artz et al, Blood Adv 2025

cancers

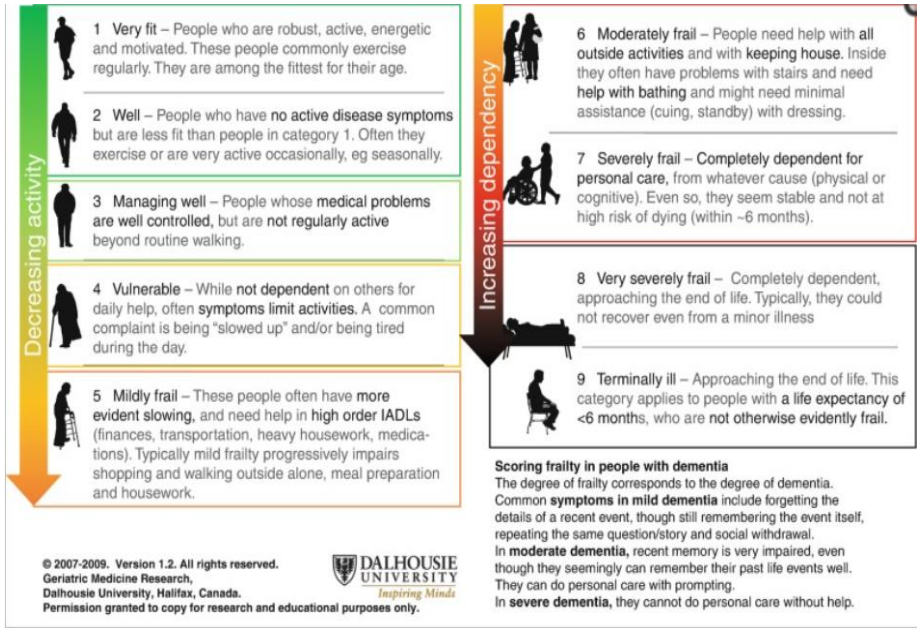
MDPI

Article

Development of a Simplified Geriatric Score-4 (SGS-4) to Predict Outcomes After Allogeneic Hematopoietic Stem Cell Transplantation in Patients Aged over 50

2025

Eugenia Accorsi Buttini [1,2,*], Alberto Zucchelli [1,3], Paolo Tura [1], Gianluca Bianco [1], Daniele Avenoso [1,4], Giovanni Campisi [5], Mirko Farina [1,4], Gabriele Magliano [4], Enrico Morello [4], Vera Radici [1,4], Nicola Polverelli [6], Domenico Russo [1,4], Alessandra Marengoni [1,3,†] and Michele Malagola [1,4,†]



Clinical Frailty Scale

Stato funzionale: ADL, IADL, Hand Grip, Gait Speed

Stato cognitivo: MMSE, MiniCOG

Screening: G8, VES-13, CFS, FIL score

Characteristics	N (%)
Number	135 (100)
Age at allo-SCT, years, median (range)	63 (50–75)
Male, n (%)	86 (63.7)
Diagnosis, n (%)	
AML	53 (39.3)
MDS	17 (12.6)
ALL	11 (8.1)
Lymphoma	13 (9.6)
MF	25 (18.5)
Other	16 (11.9)
DRI, n (%)	
Low	3 (2.2)
Intermediate	95 (70.4)
High	35 (25.9)
Very high	2 (1.5)

Characteristics	N (%)
KPS, n (%)	
90–100	126 (93.4)
70–80	9 (6.6)
HCT-CI, n (%)	
0	27 (20)
1–2	37 (27.4)
≥3	71 (52.6)
FIL score, n (%)	
Fit	132 (97.8)
Unfit	3 (2.2)
Disease status, n (%)	
1st CR	53 (39.3)
2nd or subsequent CR	82 (60.7)
Donor type, n (%)	
Related	33 (24.4)
Unrelated	63 (46.7)
Haploidentical	39 (28.9)
Stem cell source, n(%)	
PBSC	124 (91.9)
BM	11 (8.1)
Conditioning regimen, n (%)	
MAC	85 (63)
RIC	50 (37)
GVHD prophylaxis, n (%)	
CyA + MFF	3 (2.2)
CyA + MTX	4 (3)
CyA + MTX + ATG	78 (57.8)
PTCy + Other	27 (20)
Other	23 (17)
Follow-up, months, median (range)	7.5 (0.01–47.8)

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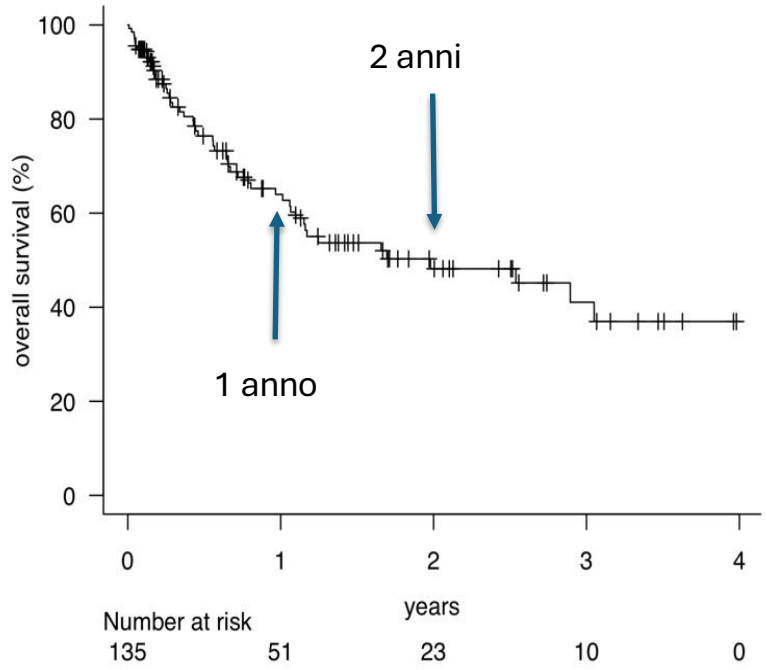
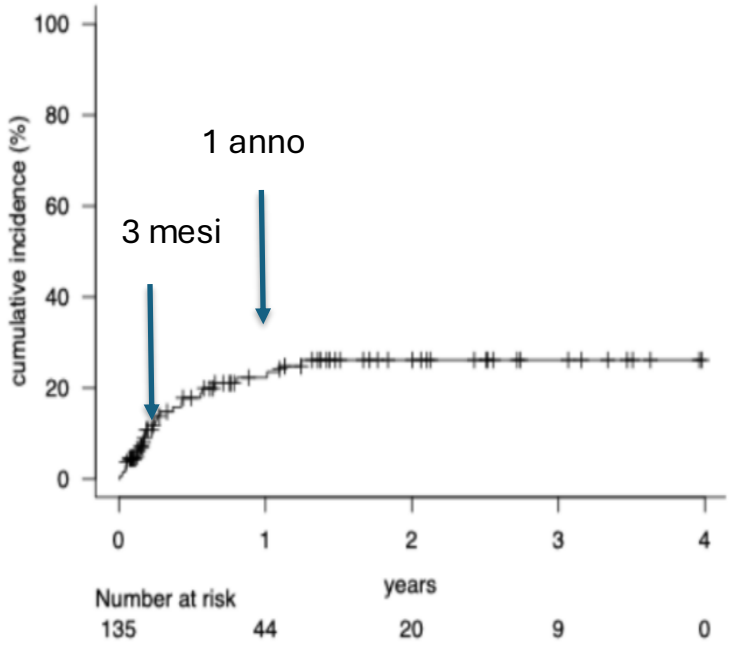
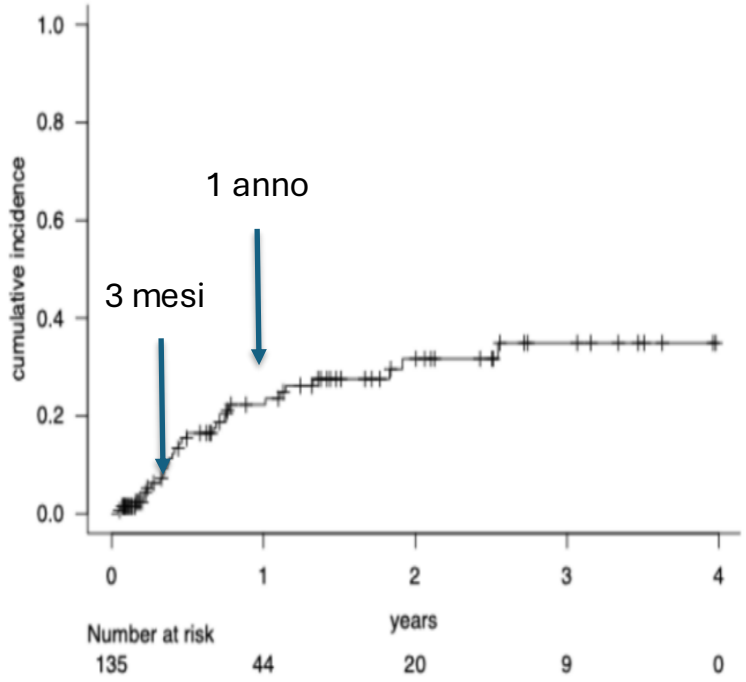
OS



NRM



CIR



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	Pts Evaluated	OS 1 y	OS 2 y	*p*	NRM 1y	NRM 2 y	*p*	CIR 1 y	CIR 2 y	*p*
ADL										
Any limitations	4	50	-		25	-		25	-	
No limitations	130	63	49	0.5	24	26	0.95	23	30	0.73
IADL										
Any limitations	118	30	50		46	24		35	35	
No limitations	15	66	30	0.11	21	46	0.11	22	21	0.72
G8, n										
≤13	51	52	46		24	24		31	37	
>13	83	67	48	0.7	24	29	0.9	17	26	0.23
VES 13, n										
≤3	14	11	11		30	30		58	58	
>3	120	67	52	0.04	23	26	0.93	18	28	0.01
FIL score										
FIT	132	65	50		24	27		21	30	
UNFIT	3	0	-	<0.01	0	23	0.41	100	-	<0.01
CFS										
FIT	75	63	55		23	23		22	35	
UNFIT	12	45	-	0.6	28	-	0.9	27	-	0.8
Gait Speed, m/s										
≤1.1	80	73	60		20	22		25	31	
>1.1	49	41	27	0.06	31	34	0.31	40	40	0.2
Chair Stand, times										
<14	90	65	50		21	22		25	32	
≥14	41	54	40	0.5	27	34	0.37	24	31	0.83
Hand Grip, Kg										
<26	37	45	30		34	38		28	41	
≥26	97	68	54	<0.01	21	21	0.05	20	28	0.6
Mini-Cog, n										
1–2	56	64	58		21	21		19	29	
3	77	60	39	0.28	24	29	0.44	26	31	0.45
MMSE, n										
≤24	13	19	19		52	52		29	48	
>24	121	66	50	0.03	22	24	0.2	22	29	0.56
HCT-CI, n										
0	27	88	33		17	17		18	25	
1–2	37	70	49		18	18		22	38	
≥3	71	55	37	0.2	29	34	0.2	28	30	0.88

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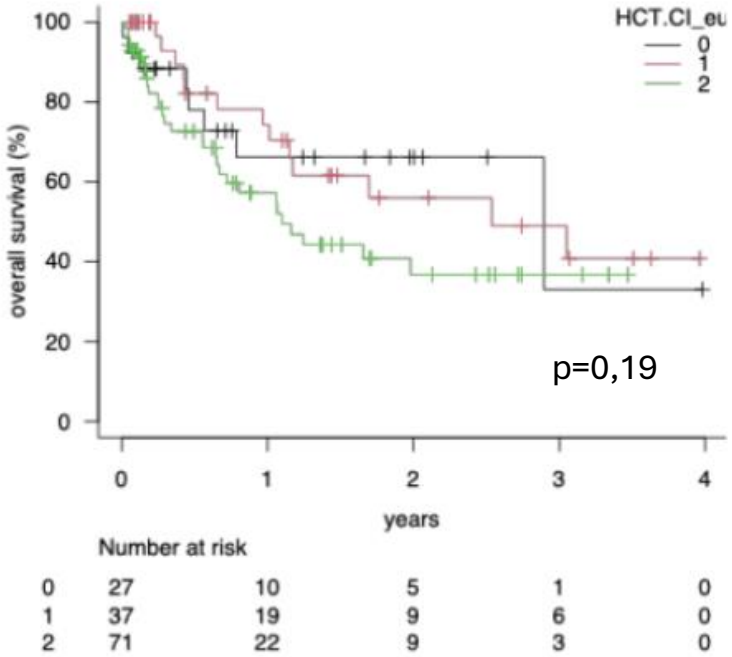
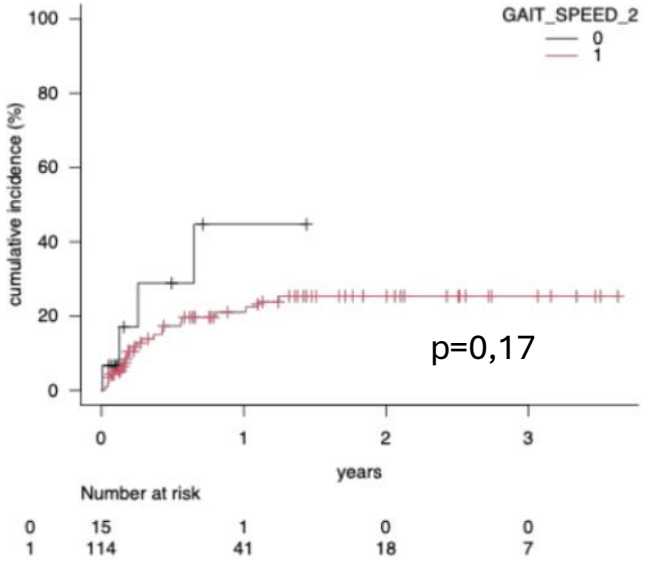
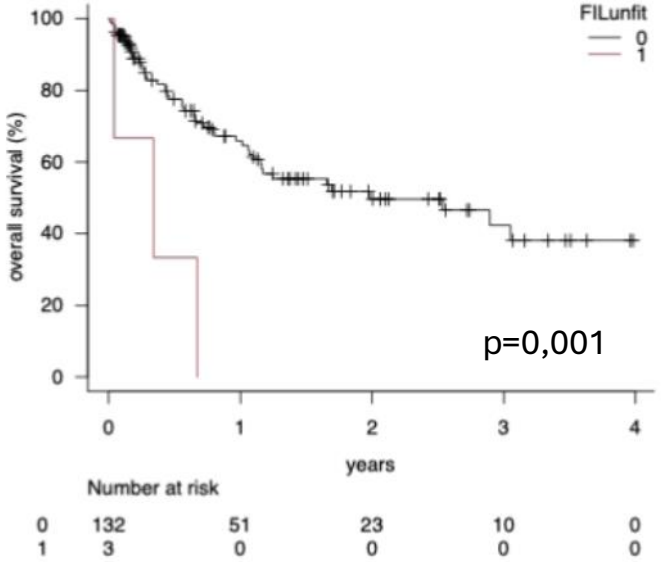
OS ACCORDING TO HCT-CI



NRM ACCORDING TO Gait Speed



OS ACCORDING TO FIL



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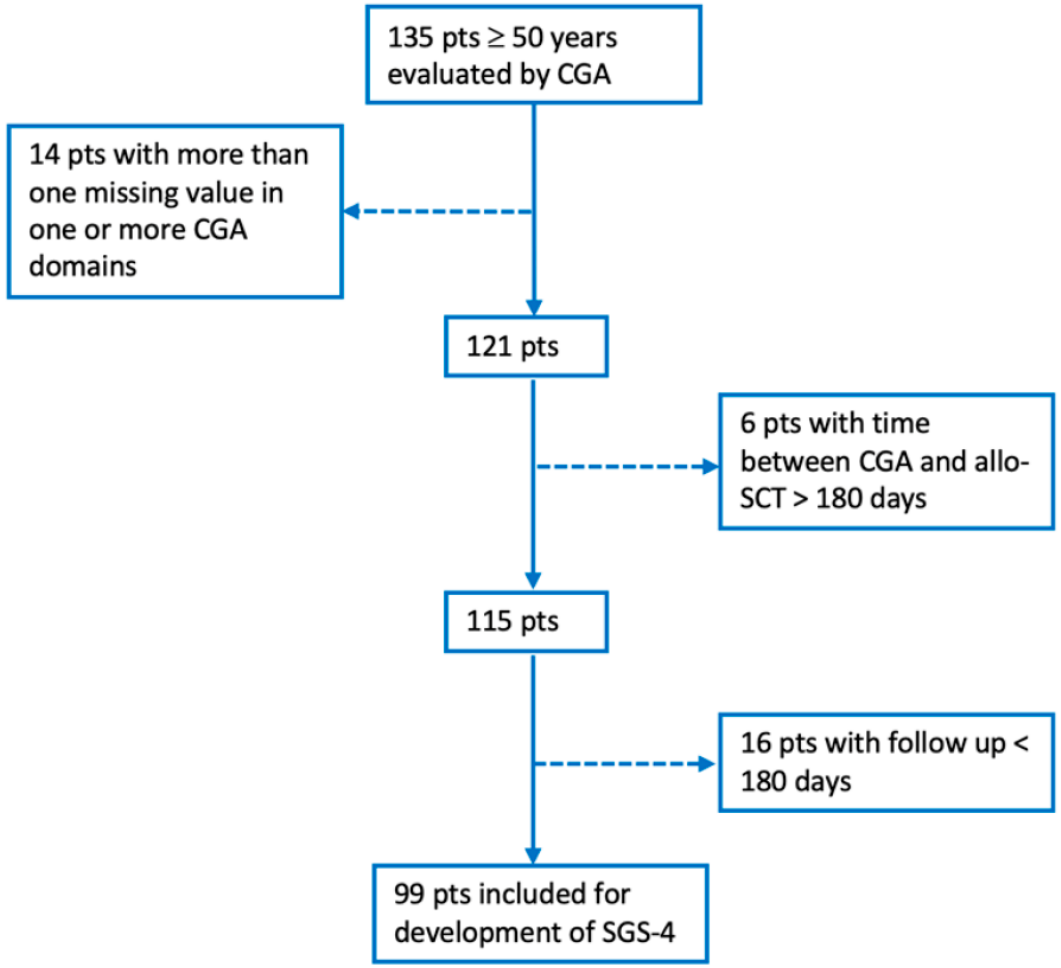
The Simplified Geriatric Score – SGS-4



Accorsi Buttini E,….., Malagola M. Cancers 2025

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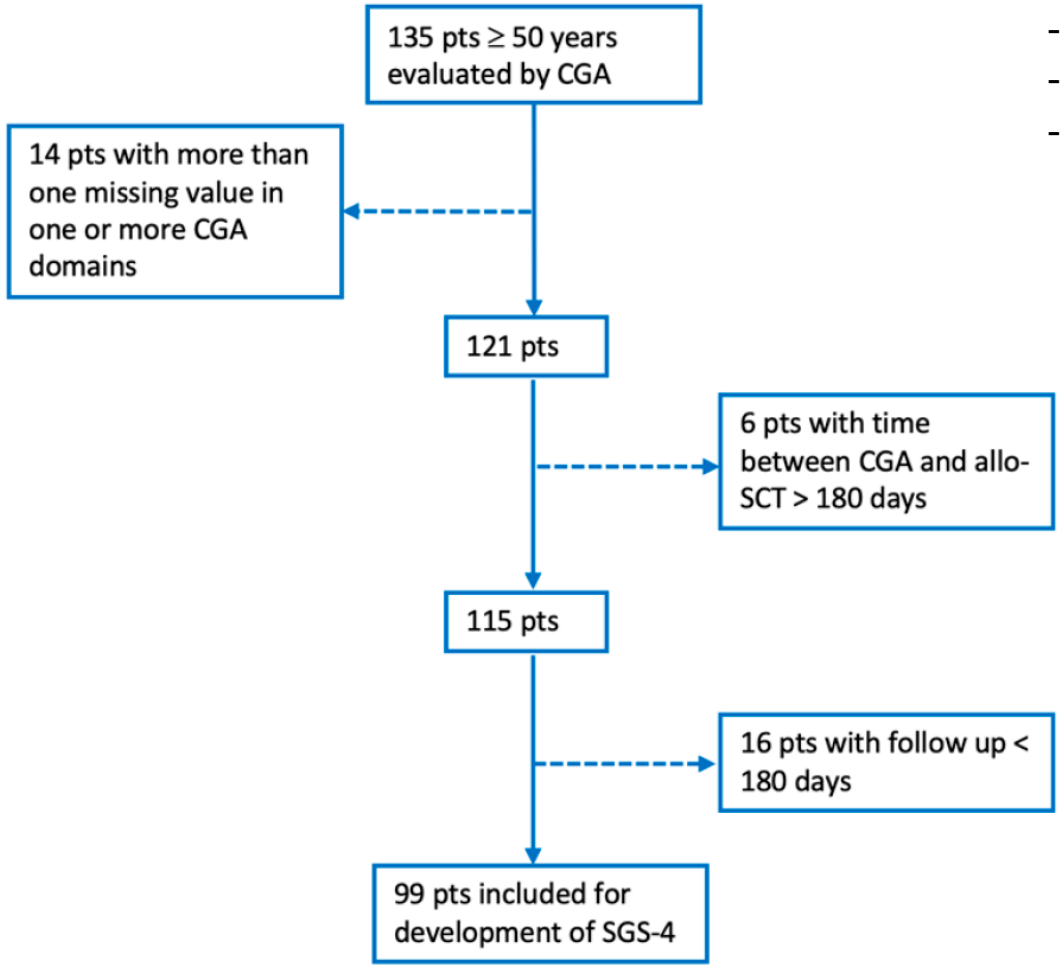
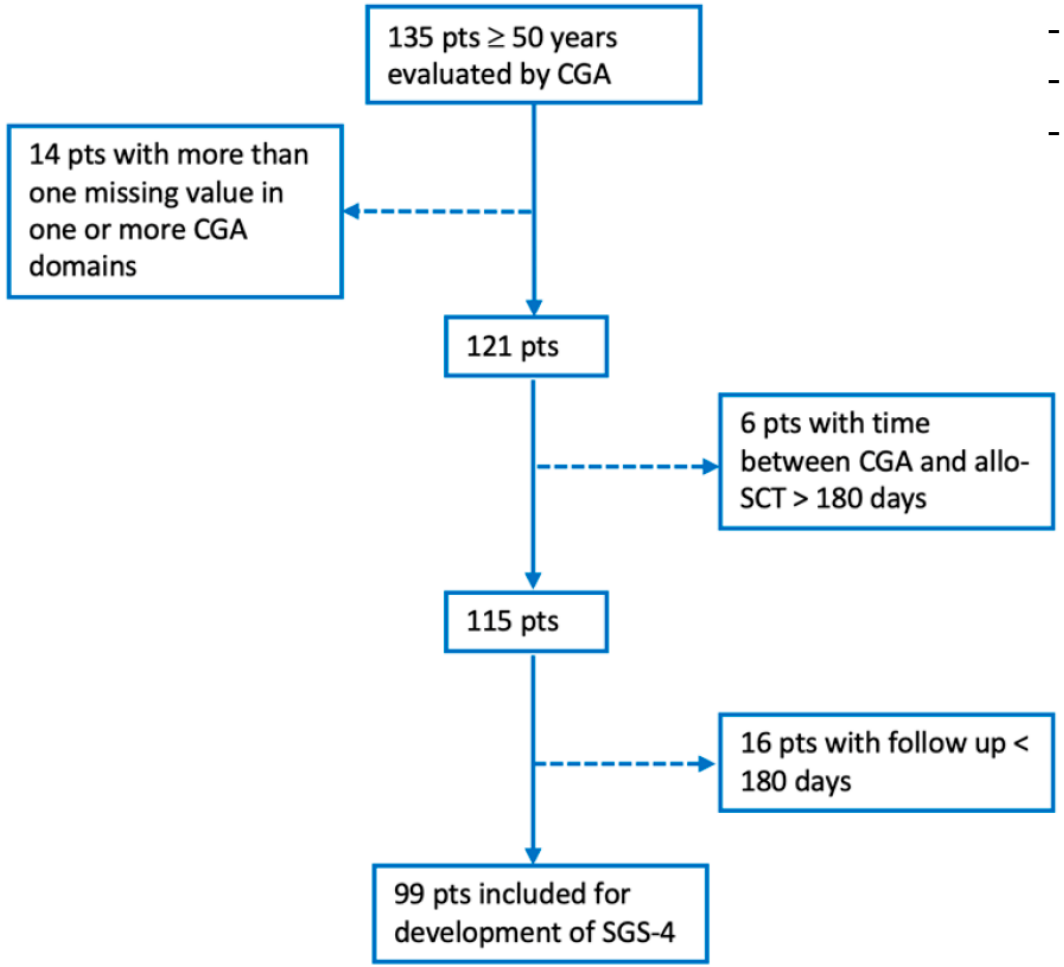


- Factor Analysis (Analisi dei Fattori Latenti)
- Calcolo dei Pesi delle Variabili sui Fattori Latenti (Metodo di Bartlett)
- Identificazione variabili con peso relativo > 0,4

Accorsi Buttini E,…..., Malagola M. Cancers 2025

The Simplified Geriatric Score – SGS-4



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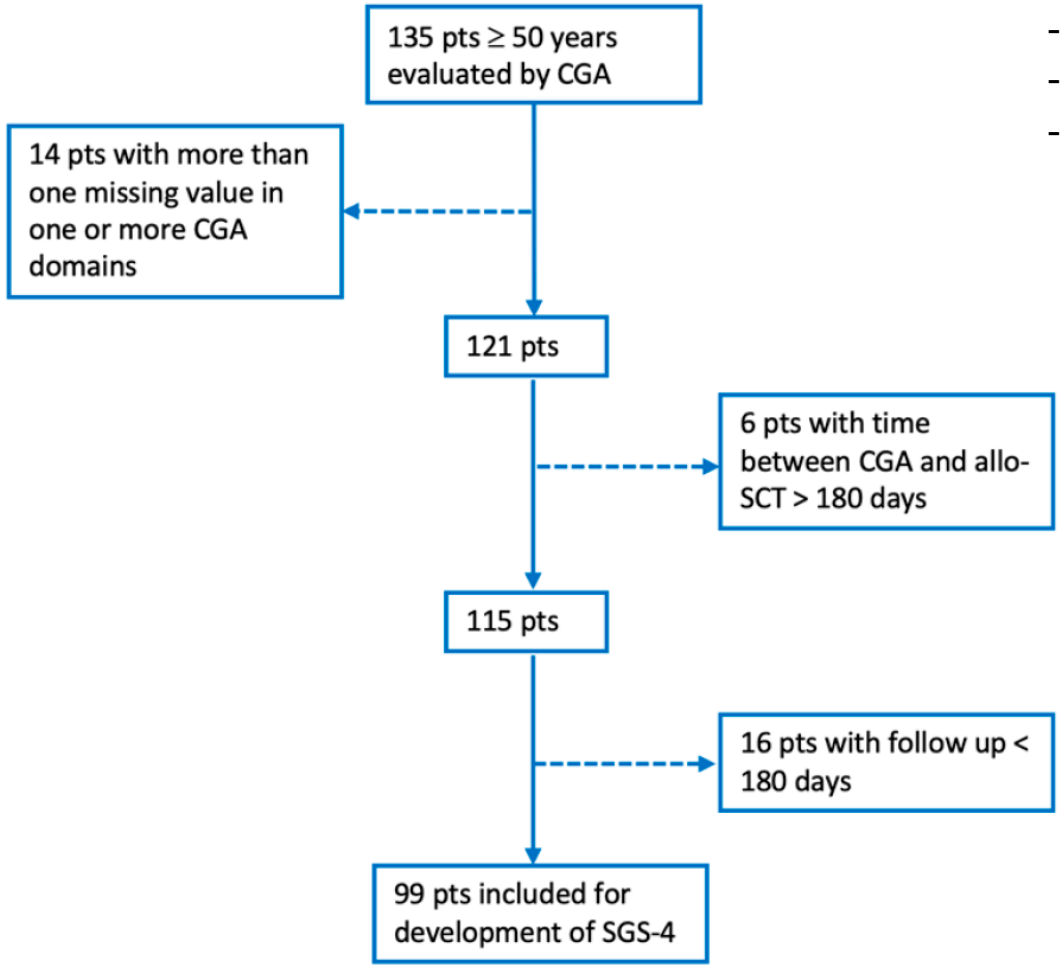
- Calcolo dei Pesi delle Variabili sui Fattori Latenti (Metodo di Bartlett)
- Identificazione variabili con peso relativo > 0,4

Valori	Gait Speed	Hand Grip	Sesso
1	</= 1.04	</= 24.5	M
2	1.04 < x </= 1.17	24.5 < </= 32.7	F
3	1.17 < x </= 1.29	32.7 < x </= 41.3	
4	1.29 < x </= 1.70	41.3 < x </= 57.6	

Accorsi Buttini E,…..., Malagola M. Cancers 2025

The Simplified Geriatric Score – SGS-4



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Valori	Gait Speed	Hand Grip	Sesso
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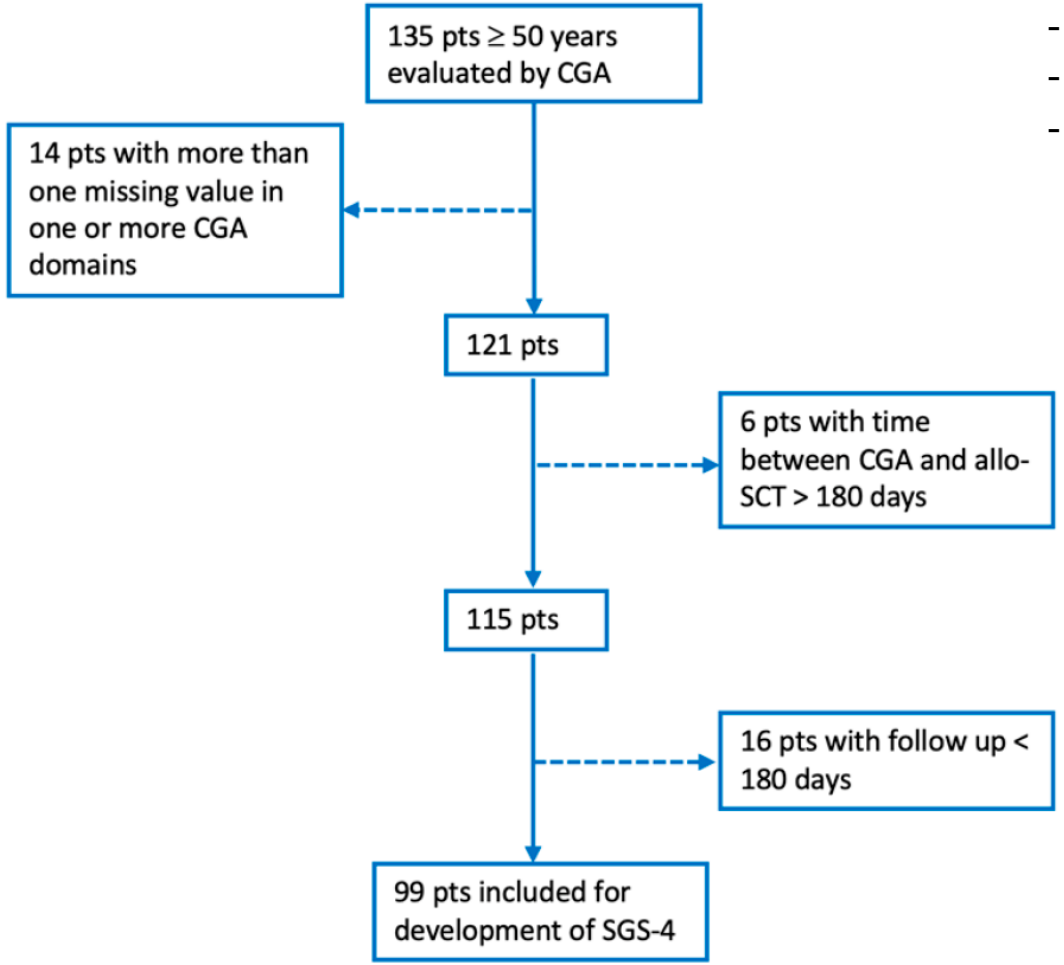
2	1.04 < x </= 1.17	24.5 < </= 32.7	F
3	1.17 < x </= 1.29	32.7 < x </= 41.3	
4	1.29 < x </= 1.70	41.3 < x </= 57.6	

Formula: [Gait Speed] + 2* [Hand Grip] + G8 + 1.5* [Sesso]

Accorsi Buttini E,….., Malagola M. Cancers 2025

The Simplified Geriatric Score – SGS-4



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3	1.17 < x </= 1.29	32.7 < x </= 41.3	
4	1.29 < x </= 1.70	41.3 < x </= 57.6	

Formula: [Gait Speed] + 2* [Hand Grip] + G8 + 1.5* [Sesso]

SCORE	**≤13**	FRAIL
	13 - 22.5	PRE-FRAIL
	> 22.5	FIT

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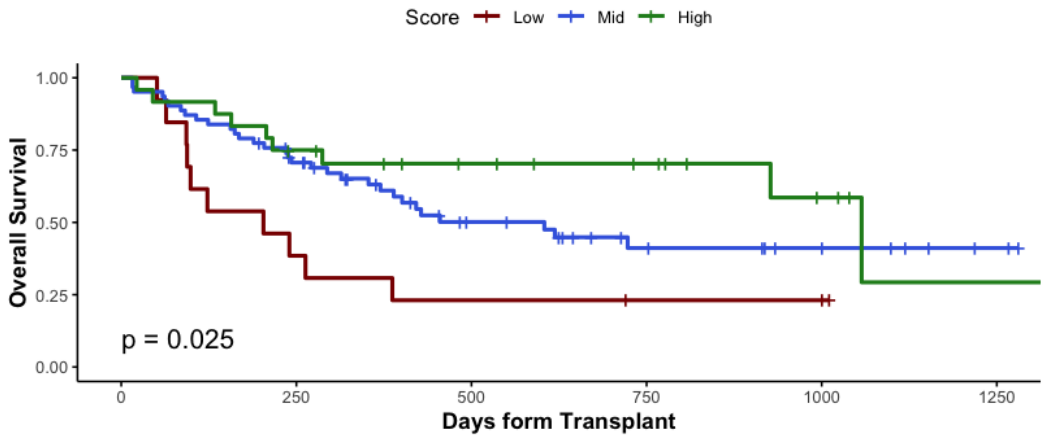
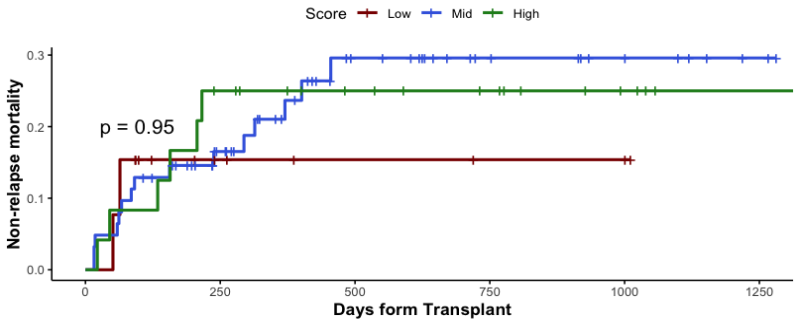
Survival plot



Number at risk

13	5	3	2	2	0
62	41	20	11	7	2
24	17	12	9	4	1

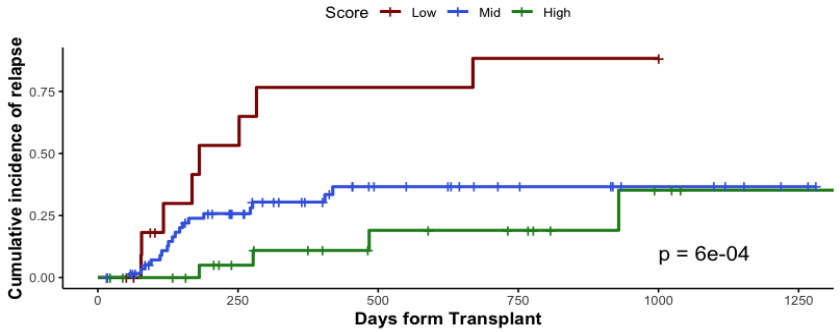
Non-relapse mortality



Number at risk

13	5	3	2	2	0
62	41	20	11	7	2
24	17	12	9	4	1

Cumulative incidence of relapse



Number at risk

13	4	2	1	1	0
62	34	16	10	6	2
24	16	10	8	3	1

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Characteristics	Total N = 99	Frail N = 13	Prefrail N = 62	Fit N = 24	p-Value
Age, years (range)	63.0 (56.0, 66.0)	64.0 (56.0, 68.0)	62.0 (57.0, 66.0)	63.0 (56.0, 65.0)	>0.9
Diagnosis, n (%)					
AL	41 (41.4)	10 (76.9)	23 (37.1)	8 (33.3)	
MDS	11 (11.1)	2 (15.4)	6 (9.7)	3 (12.5)	
Lymphoma	14 (14.1)	0 (0)	11 (17.7)	3 (12.5)	0.10
MPN	1 (1.0)	0 (0)	0 (0)	1 (4.2)	
MM	5 (5.1)	0 (0)	5 (8.1)	0 (0)	
Other	27 (27.3)	1 (7.7)	17 (27.4)	9 (37.5)	
DRI, n (%)					
1	2 (2.0)	0 (0)	1 (1.6)	1 (4.2)	
2	70 (70.7)	7 (53.8)	50 (80.7)	13 (54.2)	
3	24 (24.3)	6 (46.2)	10 (16.1)	8 (33.2)	0.08
4	2 (2.0)	0 (0)	1 (1.6)	1 (4.2)	
missing	1 (1)	0	0	1 (4.2)	
KPS, n (%)					
90–100	92 (92.9)	11 (84.6)	57 (91.9)	24 (100)	0.6
70–80	7 (7.1)	2 (15.4)	5 (8.1)	0 (0)	
HCT-CI, n (%)					
0	21 (21.2)	1 (7.7)	12 (19.4)	8 (33.3)	
1–2	28 (28.3)	3 (23.1)	16 (25.8)	9 (37.5)	0.13
≥3	50 (50.5)	9 (69.2)	34 (54.8)	7 (29.2)	
Disease status, n (%)					
1st CR	33 (33.3)	6 (46.2)	20 (32.3)	7 (29.2)	0.6
2nd or subsequent CR	66 (66.7)	7 (53.8)	42 (67.7)	17 (70.8)	
Line of Therapy, n (%)					
1	48 (49.5)	8 (61.5)	28 (45.2)	12 (52.0)	
≥2	50 (50.5)	5 (38.5)	34 (54.8)	11 (48.0)	0.5
Missing	1 (1.0)	0	0	1	
Stem cell source, n (%)					
PBSC	91(92.0)	12 (92.3)	56 (90.3)	23 (95.8)	0.9
BM	8 (8.0)	1 (7.7)	6 (9.7)	1 (4.2)	
Conditioning regimen, n (%)					
MAC	40 (40.4)	4 (30.7)	25 (40.3)	11(45.8)	0.7
RIC	59 (59.6)	9 (69.3)	37 (59.7)	13 (54.2)	
TCI score, n	2.5	2.8	2.7	3.0	0.4
Donor age, years (range)	37 (28–55)	40 (28–45)	36 (28–47)	38 (28–55)	0.9
Donor, n (%)					
Related	23 (23.2)	3 (23.1)	13 (21.0)	7 (29.2)	0.9
Unrelated	44 (44.5)	6 (46.1)	27 (43.5)	11 (45.8)	
Haploidentical	32 (32.3)	4 (30.8)	22 (35.5)	6 (25.0)	
Time to allo-SCT, months (range)	11.3 (5.7–54.9)	6.3 (5.7–10.2)	12.4 (7.1–29.0)	19.5 (6.7–54.9)	0.03
aGVHD	48 (48.5)	4 (30.8)	29 (46.8)	15 (62.5)	0.17
cGVHD	16 (16.2)	0 (0.0)	10 (16.1)	6 (25.0)	0.12

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Pre-Conditioning Frailty Phenotypes Influence Survival and Relapse for Older Allogeneic Transplantation Recipients

Anthony D. Sung[1], Thuy Koll[2], Shannon H. Gier[3], Alessandro Racioppi[1], Griffin White[3], Meagan Lew[1], Marcia Free[2], Priyal Agarwal[2], Lauren M. Bohannon[1], Ernaya J. Johnson[1], Bharathi Selvan[1], Daria V. Babushok[3], Noelle V. Frey[3], Saar I. Gill[3], Elizabeth O. Hexner[3], MaryEllen Martin[3], Alexander E. Perl[3], Keith W. Pratz[3], Selina M. Luger[3], Nelson J. Chao[1], Alfred L. Fisher[2], Edward A. Stadtmauer[3], David L. Porter[3], Alison W. Loren[3], Vijaya R. Bhatt[2], Phyllis A. Gimotty[4], Shannon R. McCurdy[3]

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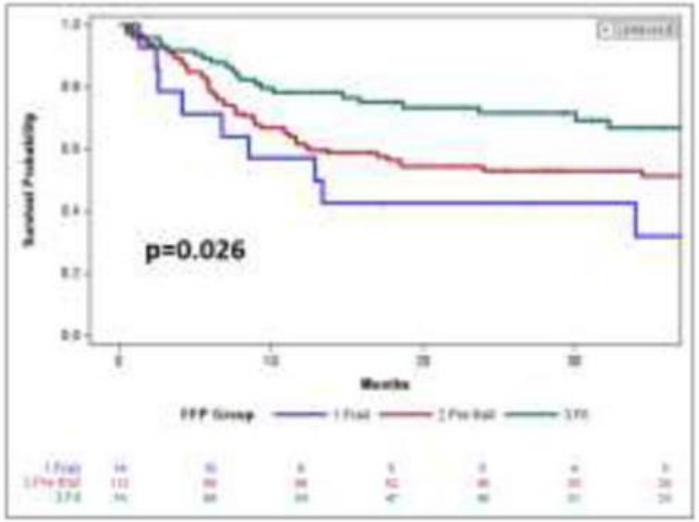
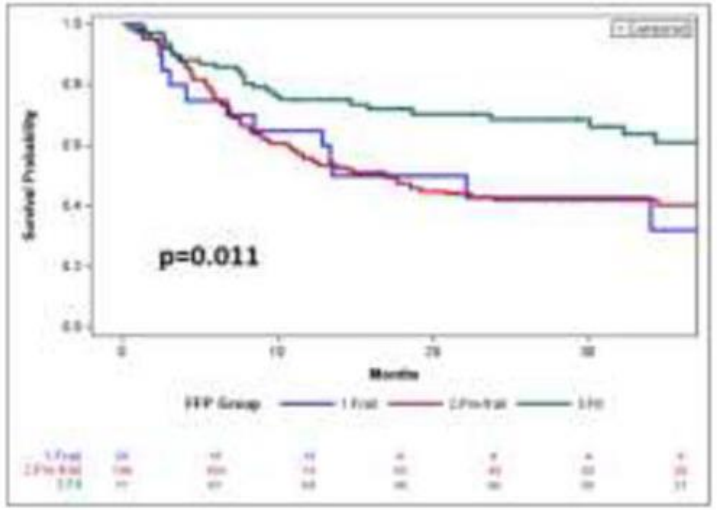
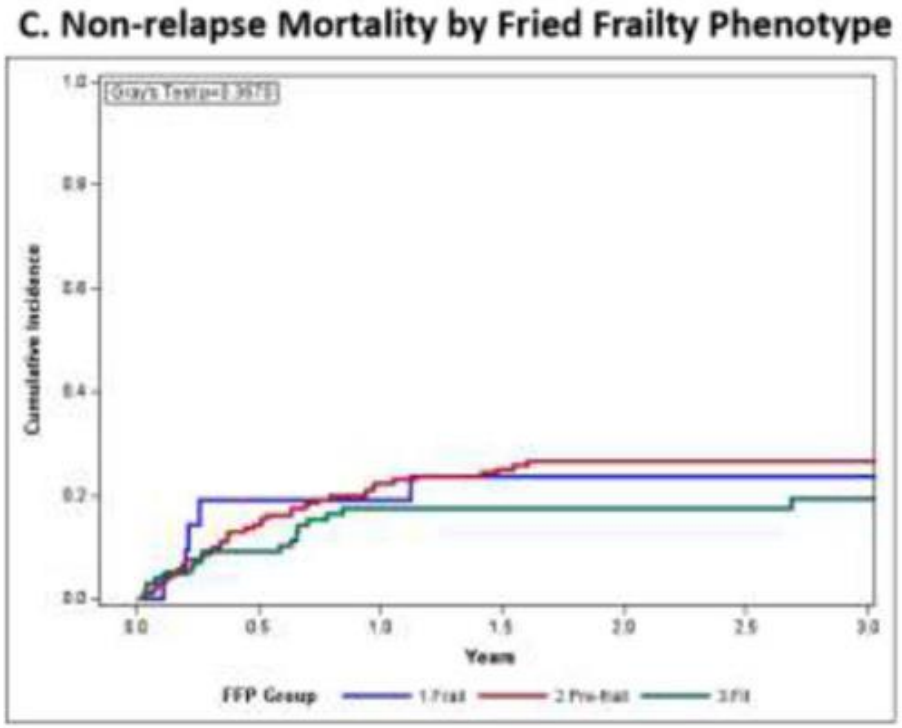
- 280 allo-SCT
- Age > 60
- Fired's Frailty Phenotype (weight loss, exhaustion, slowness, weakness)
- Pre-admission or within 30 days
- 21 FRAIL, 161 PRE-FRAIL, 98 FIT

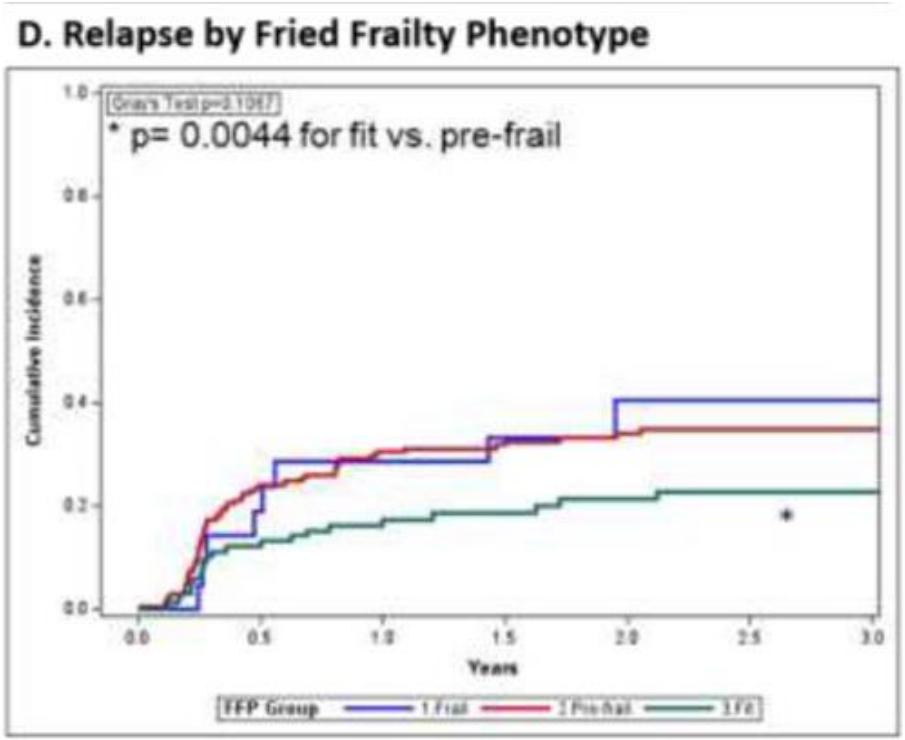
C. Patients aged 60-69 by Fried Frailty Phenotype



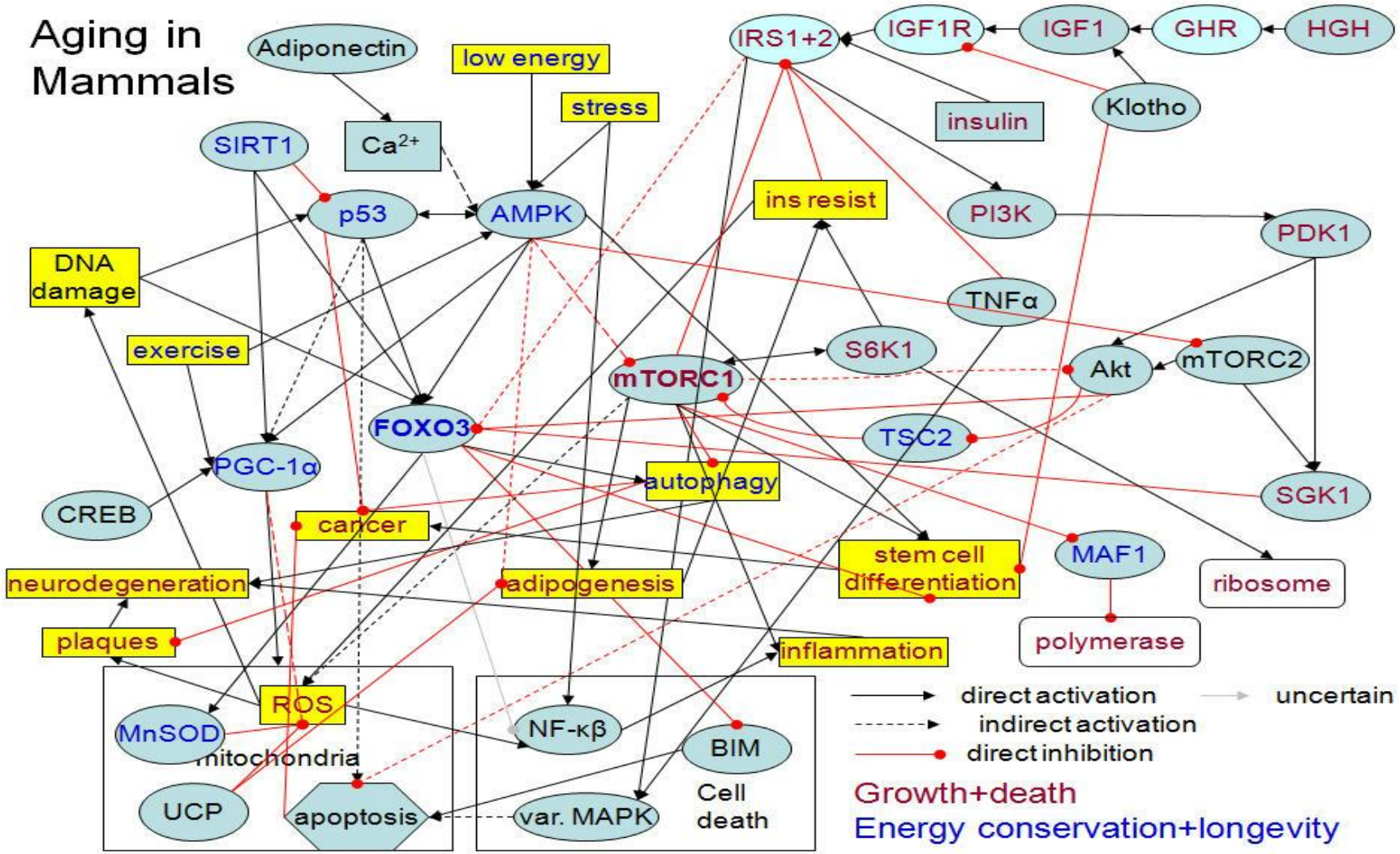
D. Patients Receiving RIC/NMA by Fried Frailty Phenotype







Sung AD et al, TCT 2025



Goertzel 2011

Sistema Socio Sanitario
Regione Lombardia
ASST Spedali Civili

ASST-SPEDALI CIVILI di BRESCIA

USD Trapianto di Midollo Adulti
Programma Terapie Cellulari nelle Malattie Onco-Ematologiche, Disimmuni e in Medicina Rigenerativa (ONEDRIVE3-CELL THERAPY)

Dipartimento Oncologico
Comprehensive Cancer Center

UNIVERSITA' degli STUDI di BRESCIA
FACOLTA' di MEDICINA e CHIRURGIA
CATTEDRA DI EMATOLOGIA

Scuola di Specializzazione di Ematologia
Dottorato in Intelligenza Artificiale in Medicina e Innovazione nella Ricerca Clinica e Metodologica
Centro di Ricerca STENMED

Dipartimento di Scienze Cliniche e Sperimentali
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UNIVERSITÀ DEGLI STUDI DI BRESCIA

ALLO-GER Study

Multicentric Prospective Validation of the Simplified Geriatric Score (SGS-4) in Patients Aged ≥60 Years with Acute Leukemias (LA) or Myelodysplastic Syndrome (MDS) Undergoing Allogeneic Hematopoietic Stem Cell Transplantation (Allo-GER Study)

Principal Investigators:
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Endpoints	Primary endpoint • OS at 12 months after allo-SCT Secondary endpoints • NRM at 100 days, 6 months and 12 months after allo-SCT • CIR at 12 months after allo-SCT • Predictive value of cytokine patterns in combination with the SGS-4 score • Feasibility of the pre-transplant geriatric assessment, defined as the proportion of enrolled patients completing gait speed, handgrip strength, and G8 screening prior to allo-SCT.
Correlatives sub-studies	Two correlative biological sub-studies will be conducted in all the enrolled patients to elucidate the mechanisms underlying aging 3) Peripheral blood samples will be collected for the assessment of circulating biomarkers related to aging, frailty, and systemic inflammation. The biomarker panel will include markers of biological aging and inflammation (IL6, tumor necrosis factor receptor II, growth differentiation factor-15 [GDF-15], IGF1, insulin, cystatin-C). 4) Starting from 1.5ml of plasma, circulating extracellular vesicles (EVs) will be isolated using a commercial kit based on columns that isolate small EVs by affinity. Then, Fourier transform infrared spectroscopy (FT-IR) will be performed using a Cary 630 FT-IR Spectrometer (Agilent Technologies) operating in transmission mode. From each sample, a volume of 2 µL of EV suspension or 2 µL of whole plasma, depending on the analysis. FT-IR spectroscopy will simultaneously provide information on the main classes of biomolecules: lipids, proteins, nucleic acids, and carbohydrates, allowing the chemical-structural composition and organization of cellular systems and EVs to be investigated.

Statistical design	Sample size calculation. A total of approximately 300 patients will be enrolled in this study. This sample size was estimated assuming a 1-year mortality rate of 30%, corresponding to ~100 events—sufficient for robust model validation. With this size, the 95% CI around an expected AUC of 0.65 is estimated at ±0.07. For FT-IR spectra analyses, subsequent bioinformatic and biostatistics analyses (PCA and LDA) will be necessary to compare the different components and identify biological subgroups among the samples analyzed.

2 years for recruitment

1 year of f up for the last recruited patient

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Allo-GER Study

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CET Submission – 30/04/26 / 12/6/26

CET Approval - 5/8/26

ASST Spedali Civili Authorisation – 15/9/26

1° Patient (BS) – 21/9/26

Centers' activation ongoing

Frailty assessment and allo-SCT

- Allo-SCT may cure approximately 50% of elderly patients (in particularly AL > 60 yrs)
- Age is not a “stand alone” selection criteria
- Comorbidities are not enough → modulation of transplant platforms

- **PATIENT’S SELECTION IS CRUCIAL**
- Different scores? Is there a winner?
- Underlying biological mechanisms
- Assessment of vulnerabilities (pre-habilitation) → PROSPECTIVE STUDIES !!

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